



# General Assembly

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## Committee on the Peaceful Uses of Outer Space

### Report on the United Nations/Jordan Workshop on Global Partnership in Space Exploration and Innovation

(Amman, 25–28 March 2019)

#### I. Introduction

1. The United Nations/Jordan Workshop on Global Partnership in Space Exploration and Innovation, held in Amman from 25 to 28 March 2019, was jointly organized by the Office for Outer Space Affairs of the Secretariat and the Regional Centre for Space Science and Technology Education for Western Asia, affiliated to the United Nations. Support for the Workshop was provided by the Arab Union for Astronomy and Space Sciences, the Inter-Islamic Network on Space Sciences and Technology and the Royal Jordanian Geographic Centre.
2. The Workshop was attended by scientists, engineers, university educators, students, policymakers, decision makers and experts representing international, regional, national and local institutions, intergovernmental and non-governmental organizations, research and development institutions, industry and other private sector entities.
3. The present report describes the background, objectives and programme of the Workshop, provides a summary of the programme and concludes with the observations and recommendations agreed by the participants.

#### A. Background and objectives

4. During its fifty-ninth session, in 2016, the Committee on the Peaceful Uses of Outer Space endorsed seven thematic priorities in the run-up to the celebration of the fiftieth anniversary of the first United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE+50). The objective of thematic priority 1 (“Global partnership in space exploration and innovation”) consisted of the following: (a) raising awareness of space exploration and innovation as essential drivers for opening up new domains in space science and technology, triggering new partnerships and developing capabilities that created new opportunities for addressing global challenges; (b) fostering dialogue with the space industry and the private sector; (c) promoting cooperation between spacefaring nations and emerging spacefaring nations; (d) allowing space exploration activities to become open and inclusive on a global scale; and (e) identifying governance and cooperation mechanisms to support the objective. (A/71/20, para. 296).



5. Also in 2016, the Committee called upon States, permanent observers to the Committee and relevant United Nations entities to join a new action team to be established under thematic priority 1. Austria, Canada, China, France, Germany, India, Italy, Japan, Jordan, Luxembourg, Pakistan, Poland, Qatar, Romania, the Russian Federation, Saudi Arabia, South Africa, Switzerland, Tunisia, the United Arab Emirates, the United Kingdom of Great Britain and Northern Ireland, and the United States of America, as well as the Committee on Space Research (COSPAR), the European Southern Observatory, the European Science Foundation, the European Space Agency, the Inter-Islamic Network on Space Sciences and Technology, the International Law Association, the National Space Society and the United Nations Environment Programme became members of the Action Team on Exploration and Innovation. China, Jordan and the United States acted as the Co-Chairs of the Action Team. Substantive and secretariat support was provided by the Office for Outer Space Affairs.

6. The final terms of reference, made available to the Committee at its sixtieth session, in June 2017, described the fields of study and working methods of the Action Team (A/AC.105/2017/CRP.21). The United Nations/Jordan Workshop was provided for in the terms of reference, although for logistical reasons, the timing of the event had to be changed from 2018 to 2019.

7. During its meetings held in Dubai, United Arab Emirates, in November 2017, in connection with the [United Nations/United Arab Emirates High-level Forum on Space as a Driver for Socioeconomic Sustainable Development](#), the Action Team reached consensus on a document on thematic priority 1, issued in the form of a note by the Secretariat, which included seven recommendations (A/AC.105/C.1/114).

8. The note was before delegations in early 2018 at the fifty-fifth session of the Scientific and Technical Subcommittee, as was conference room paper A/AC.105/C.1/2018/CRP.3, which provided further procedural details about the work of the Action Team. An updated version of the note ([A/AC.105/1168](#)) was prepared for presentation to the Committee at its sixty-first session, which was to take place later that year. At its sixty-first session, the Committee considered the report and its recommendations and, as recommended by the Action Team, agreed to include a new regular item, entitled "Space exploration and innovation" in its agenda ([A/73/20](#), para. 364).

9. The main objectives of the United Nations/Jordan Workshop were: (a) build on the work of the Action Team on Exploration and Innovation; (b) build capacity in space exploration and innovation, with emphasis on science, technology, engineering and mathematics, in line with the recommendation of the Action Team, ([A/AC.105/1168](#), para. 114); (c) promote the exchange of actual experiences in global partnership for space exploration and innovation; (d) work towards making it possible for space exploration activities to become open and inclusive on a global scale; and (e) provide the Regional Centre for Space Science and Technology Education for Western Asia, affiliated to the United Nations with an opportunity to showcase and promote its work.

## **B. Attendance**

10. The Workshop was attended by decision makers and policymakers of national space agencies and governmental bodies, by business experts and by researchers, students and specialists from academia. Experts from the broader space community from the following countries also attended: Armenia, Australia, Austria, Bahrain, Brazil, Canada, Chile, China, Colombia, Egypt, France, Germany, Greece, India, Iran (Islamic Republic of), Iraq, Italy, Japan, Jordan, Lebanon, Libya, Mexico, Morocco, Nigeria, Oman, Pakistan, Qatar, Russian Federation, Sudan, Syrian Arab Republic, Tunisia, Turkey, United Arab Emirates, United Kingdom of Great Britain and Northern Ireland, United States of America and Yemen, as well as the State of Palestine. The Workshop was also attended by representatives of the Arab Union for

Astronomy and Space Sciences, the European Space Agency, the Inter-Islamic Network on Space Sciences and Technology, the International Astronomical Union, the International Institute for the Unification of Private Law (Unidroit), the Secure World Foundation, the Space Generation Advisory Council and the Office for Outer Space Affairs.

11. Funds provided by the United Nations, Jordan and Inter-Islamic Network on Space Sciences and Technology were used to defray the costs of air travel, local transport and accommodation for 22 participants.

12. Gratitude was expressed to King Abdullah II of Jordan, the Prime Minister and the Chairman of the Joint Chiefs of Staff for their support in making the Workshop a success.

13. For its part, Jordan expressed its desire to host a further United Nations workshop or activity on space science and technology in 2020 or 2021.

### **C. Programme**

14. The programme of the Workshop was developed by the Office for Outer Space Affairs and the Regional Centre for Space Science and Technology Education for Western Asia, affiliated to the United Nations.

15. Six thematic sessions were held, at which participants presented their views on a range of themes related to global partnership in space exploration and innovation. The programme also included a poster session and an event on the “Space for women” initiative. All presentations and posters were made available on the website of the Office for Outer Space Affairs ([www.unoosa.org](http://www.unoosa.org)).

16. Also as part of the programme, the local organizing committee had arranged a full-day side visit to Wadi Rum, a unique terrestrial analogue to Mars.

17. Participants were invited to visit an exhibition organized by the local organizing committee at the Regional Centre for Space Science and Technology Education for Western Asia, affiliated to the United Nations, the venue of the Workshop.

18. The directors general of the regional centres for space science and technology education, affiliated to the United Nations, took the opportunity to meet on the margins of the Workshop.

## **II. Summary of the programme**

19. The Workshop was held at the newly opened premises of the Regional Centre for Space Science and Technology Education for Western Asia, affiliated to the United Nations. During the opening ceremony welcome speeches were given, including by a representative of the Prime Minister of Jordan.

20. Participants in the first thematic session focused on current space exploration and innovation programmes. Speakers summarized national and international collaborative efforts as related to national space policies; the development of satellites; remote sensing operations and geographical information systems; missions in low-Earth orbit; lunar missions; Mars missions; asteroid missions; synergies between science, robotics and human exploration; surface and subsurface explorations; field investigations into general relativity and gravity; space debris; and space weather.

21. Participants in the second thematic session considered current and potential future cooperation mechanisms for space exploration and innovation. Speakers highlighted the regional centres for space science and technology education; affiliated to the United Nations; the second International Space Exploration Forum; the International Space Exploration Coordination Group and its Global Exploration Roadmap; the Action Team on Exploration and Innovation of the Committee on the

Peaceful Uses of Outer Space; and existing United Nations documents relevant to international mechanisms for cooperation in the peaceful uses of outer space.

22. Participants in the third thematic session explored the development of open and inclusive partnerships for global space exploration. They considered asset-based financing for the private space sector, commercial mission support services, the regional centres for space science and technology education, affiliated to the United Nations, the work of the Hague International Space Resources Governance Working Group and opportunities for emerging space actors.

23. At the fourth thematic session, speakers discussed planetary protection from various perspectives. The work of the COSPAR Panel on Planetary Protection was presented, which included the international legal framework and the COSPAR planetary protection policy. The big questions of astrobiology were considered (What are the origins of life in the universe? How is it distributed? What is its future?), as was, from the point of view of environmental economics, the question of back-contamination, i.e. the introduction of extraterrestrial organisms to the Earth's biosphere.

24. Participants in the fifth thematic session focused on space and astrophysics. Topics included the origin of heavy elements in the universe, the comparison of parallax measurements, high-mass x-ray binary star systems observed by satellite and the tracking of space debris from Changchun Observatory, China.

25. The sixth thematic session was devoted to a discussion of terrestrial analogues to space environments. Participants discussed how analogue environments had been used since the beginning of the space era to test the behaviour and performance of spacecraft and instruments, and noted that the increase in the number of exploration missions would make analogue environments increasingly important. The need for international cooperation in managing test sites, preparing test ranges, organizing tests and involving operators was also flagged.

26. At the poster session, presenters gave five-minute summaries of their topics. Workshop participants were encouraged to engage in informal exchanges during the breaks. The posters covered a wide variety of topics, including, but not limited to, design considerations relating to planetary landers for lunar exploration missions; synthetic nanomaterial technology and sustainable settlements; space technologies and Sustainable Development Goal 4 (quality education); studying the atmosphere of Mars as part of the Emirates Mars Mission; and the Euclid Visible Instrument.

27. During the event on the "Space for women" initiative, participants discussed ways to ensure that the benefits of space science and technology reached women and girls. Participants paid tribute to women who had been trailblazers in the field of space exploration and shared personal stories and experiences. Gender equality was discussed from various perspectives, as were ways to attract more women and girls to science, technology, engineering and mathematics and to keep them professionally engaged in those fields.

### **III. Observations and recommendations**

#### **A. Observations**

28. Participants noted that the Workshop was building on the work of the Action Team on Exploration and Innovation, and that it provided them with both strategic and capacity-building opportunities and was linked to a number of Sustainable Development Goals, including Sustainable Development Goal 4, on quality education, Sustainable Development Goal 5, on gender equality, Sustainable Development Goal 9, on industry, innovation and infrastructure, and Sustainable Development Goal 17, on the Global Partnership for Sustainable Development.

29. Workshop participants recognized that extending human exploration deeper into the solar system, from low-Earth orbit to the Moon, Mars and beyond, was a goal widely shared by the international community.
30. Workshop participants recognized the key role played by existing international mechanisms for the coordination of space exploration, such as the International Space Exploration Forum and the International Space Exploration Coordination Group.
31. Workshop participants acknowledged other types of collaboration models, including support services for commercial missions, which may reduce costs, simplify the transportation of payloads and offer missions greater possibilities.
32. Workshop participants recognized that space exploration inspired the collective imagination and motivated young people to pursue careers in science, technology, engineering and mathematics.
33. Workshop participants welcomed the Access to Space for All initiative of the Office for Outer Space Affairs, whose aim was to eliminate the space divide – the gap between countries that have space capabilities and those that do not – and to create related opportunities for emerging space actors, such as the forthcoming opportunity for access to the Bartolomeo platform on the International Space Station.
34. Workshop participants noted that, as space became an increasingly commercial domain, national Governments were using policy and financial tools to competitively position their emerging space sectors, including the space resources sector, for growth.
35. Workshop participants noted that the capability to utilize space resources could offer humanity a gateway to the further exploration of outer space and a sustained human presence beyond low-Earth orbit.
36. Workshop participants noted that it was desirable to reduce legal and policy uncertainties relating to the exploration, exploitation and utilization of space resources.
37. Workshop participants noted that the empowerment of women was a pre-condition for achieving sustainable development worldwide, and that women's involvement in the space sector mattered when it came to the rights of women to benefit from science and technology.
38. Workshop participants noted that more inclusive and diverse teams benefited from more varied skills and ideas and thereby led to more innovative and successful research and development businesses and not-for-profit entities that made gains in efficiency, productivity and financial performance.
39. Workshop participants noted the usefulness of asset-based financing for the private space sector, as facilitated by the Protocol to the Convention on International Interests in Mobile Equipment on Matters Specific to Space Assets.
40. Workshop participants recognized that planetary protection was a critical factor in enabling scientists to study the natural environments of celestial bodies and preserving the terrestrial biosphere from possible contamination by alien material.
41. Workshop participants recognized the crucial role of the Panel on Planetary Protection of COSPAR in maintaining the planetary protection policy in order to provide guidance and support to all States that were pursuing planetary exploration.
42. Workshop participants recognized that terrestrial analogues were of paramount importance, as they made it possible to test scientific instruments on Earth, conduct research and develop planetary missions.
43. Workshop participants noted the increasing importance of integrating space law and policy into cross-sectorial capacity-building activities, such as the present Workshop.

44. Workshop participants acknowledged the important role played by the regional centres for space science and technology education, affiliated to the United Nations, in a broad range of disciplines covering space science, technology, law and policy.
45. Workshop participants welcomed the role played by the Regional Centre for Space Science and Technology Education for Western Asia, affiliated to the United Nations, and by other regional centres in developing space science and technology education at the regional level, in particular academic and training programmes.
46. Workshop participants noted the importance of astrophysics for the continuous development of indigenous space science capacity.
47. Workshop participants welcomed the collaboration on the charter of the Arab Space Coordination Group, initiated at the Global Space Congress in Abu Dhabi from 19 to 21 March 2019, by Algeria, Bahrain, Egypt, Jordan, Kuwait, Lebanon, Morocco, Oman, Saudi Arabia, the Sudan and the United Arab Emirates, to advance the development of the region's space sector.
48. Workshop participants took note of the gathering of Arab States (Bahrain, Egypt, Iraq, Jordan, Lebanon, Morocco, Oman, Qatar and Tunisia) regarding the Arab Regional Office of Astronomy for Development under the umbrella of the International Astronomical Union, and the role it played in enhancing the coordination and cooperation in astronomy and space science.

## **B. Recommendations**

49. Workshop participants recommended the promotion and conduct of activities that further engaged young people in science, technology, engineering and mathematics within the context of space exploration and innovation, the benefits of which would extend far beyond the topic of space exploration and innovation itself.
50. Workshop participants recommended that States use the new agenda item on space exploration and innovation, to be considered for the first time by the Committee on the Peaceful Uses of Outer Space in June 2019, as a way to share information on space programmes, build transparency and confidence, and build the capacity of new and emerging space actors.
51. Workshop participants recommended that further capacity-building activities be undertaken in connection with space exploration and innovation for the benefit of, in particular, developing countries and emerging spacefaring nations.
52. Workshop participants recommended the continuation of inclusive international coordination and cooperation efforts, such as forums held at the ministerial level and exploration road maps agreed among space agencies, so as to promote exchanges on space exploration and innovation.
53. Workshop participants recommended that States pursuing planetary missions through governmental and non-governmental entities work actively with the COSPAR Planetary Protection Panel in developing and maintaining the highest scientific standards in planetary protection, taking into account the specific needs of planetary missions.
54. Workshop participants recommended that a common atlas of terrestrial analogues be developed under the coordination of the Office for Outer Space Affairs.
55. Workshop participants recommended continued North-South, South-South and triangular cooperation in fields related to space exploration and innovation.
56. Workshop participants recommended that an alliance of regional centres be established under the umbrella of the Office for Outer Space Affairs, and that the Office should take the lead in doing so.

57. Workshop participants recommended that States examine ways to develop opportunities for national professionals from developing countries working abroad to return to their home countries to support their emerging national space industries.

58. Workshop participants noted that it was important to have female role models in space science with which people from diverse backgrounds could identify, and to that end recommended the strengthening of efforts to create a network of female champions and mentors under the “Space for women” initiative of the Office for Outer Space Affairs.

#### **IV. Conclusions**

59. The United Nations/Jordan Workshop on Global Partnership in Space Exploration and Innovation was unique in that it was the first workshop co-organized by the Office for Outer Space Affairs to be devoted to the topic. The Workshop built on the intergovernmental work previously undertaken by the Action Team on Exploration and Innovation and included cross-sectoral, capacity-building and strategic components.

60. Recognition was expressed for the unique opportunities that holding a joint workshop at a regional centre for space science and technology education had created.

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