



**Committee on the Peaceful
Uses of Outer Space
Scientific and Technical Subcommittee
Fifty-sixth session
Vienna, 11–22 February 2019**

Draft report**VIII. Space weather**

1. In accordance with General Assembly resolution [73/91](#), the Scientific and Technical Subcommittee considered agenda item 10, entitled “Space weather”.
2. The representatives of Canada, Chile, China, Colombia, Germany, India, Indonesia, Italy, Japan, Mexico, Norway, the Russian Federation, South Africa and the United States made statements under agenda item 10. During the general exchange of views, statements relating to the item were made by representatives of other member States.
3. The Subcommittee heard the following scientific and technical presentations:
 - (a) “Opportunities in space and atmospheric science at INPE”, by the representative of Brazil;
 - (b) “The next scientific program of SCOSTEP: 2019–2023”, by the observer for the Scientific Committee on Solar-Terrestrial Physics;
 - (c) “2018 space weather activities in Ukraine”, by the representative of Ukraine;
 - (d) “Recent and future solar-terrestrial physics activities in Switzerland”, by the observer for the Scientific Committee on Solar-Terrestrial Physics;
 - (e) “Operational space weather practices as a service to society in South Africa”, by the representative of South Africa.
4. The Subcommittee welcomed the COSPAR symposium on space weather and small satellites, held on 11 February 2019 on the margins of the current session, at which the participants had analysed needs relating to and opportunities offered by the use of small satellites to monitor and research space weather.
5. The Subcommittee noted that space weather, which was caused by solar variability, was an international concern owing to the potential threat it posed to space systems, human space flight and the ground- and space-based infrastructure upon which society increasingly relied. As such, it needed to be addressed in a global manner, through international cooperation and coordination, in order to be able to predict potentially severe space weather events and mitigate their impact to guarantee the long-term sustainability of outer space activities.



6. In that regard, the Subcommittee underlined the importance of constructing an international space weather framework and noted that the matter was addressed under UNISPACE+50 thematic priority 4 (International framework for space weather services). The Subcommittee expressed its appreciation for the work of the Expert Group on Space Weather of the Scientific and Technical Subcommittee.
7. The Subcommittee noted that there was a need for a reliable, high-quality and accurate means of forecasting space weather and for the participation of countries around the world in space-based and ground-based measurements and forecast services.
8. The Subcommittee also noted a number of national and international activities undertaken in the fields of research, training and education to improve the scientific and technical understanding of the adverse effects of space weather and thus strengthen global resilience to it.
9. Some delegations expressed the view that they supported the establishment of a dedicated international coordination group for space weather, within existing resources. Such a group could improve international collaboration and coordination and contribute to enhancing global resilience to the adverse effects of space weather under the space society pillar of the “Space2030” agenda.
10. Some delegations expressed the view that activities related to space weather could have an impact on aviation and, in particular, could interrupt high-frequency communications and satellite navigation.
11. In that regard, the Subcommittee noted the establishment of the Pan-European Consortium for Aviation Space Weather User Services (PECASUS). PECASUS had been selected by ICAO as one of three global space weather information centres tasked with providing information to the civil aviation sector about space weather that might affect communications, navigation and the health of passengers and crew. The Subcommittee also noted the establishment of regional warning centres for space weather in the Russian Federation and South Africa.
12. The view was expressed that space weather monitoring and the dissemination of space weather warnings required a high degree of integration of ground- and space-based observation data. Therefore, when considering the establishment of the global space weather monitoring centres to provide space weather warning services to ensure flight safety, ICAO should fully take into account the monitoring capabilities of member States and the advantages created by their geographical location.
13. The view was expressed that, in spite of the scientific progress made in the field of space weather, further work should be done to develop an alternative plan to mitigate the effect of high-impact solar explosions, regardless of whether their time, intensity and impact on Earth could be forecast.
14. The Subcommittee noted that the steering committee of the International Space Weather Initiative (ISWI) had held a meeting on the margins of the current session. Topics of discussion had been the ISWI instrument arrays and their status of operation and coordination, and the operational use of space weather data. The Subcommittee also noted that ISWI was to hold a workshop at the Abdus Salam International Centre for Theoretical Physics in Trieste, Italy, from 20 to 24 May 2019. The purpose of the workshop, which was supported by the Office for Outer Space Affairs, was to raise awareness among Member States of the impact of space weather.
15. At the 903rd meeting of the Subcommittee, on 15 February, the Rapporteur of the Expert Group on Space Weather reported on the progress made by the Expert Group during the meetings it had held on the margins of the current session of the Subcommittee.
16. The Expert Group had reiterated its commitment to the goal of improved international space weather services, which was to be reached by facilitating

enhanced coordination between relevant international stakeholders as they implemented specific joint projects.

17. In that connection, the Expert Group had identified the following areas of focus:

- (a) Encouraging the enhancement and development of an international space weather warning network;
- (b) Promoting the efficient further development of space weather services in response to user needs;
- (c) Promoting the recognition by member States of the importance of space weather and the risks it carried;
- (d) Encouraging member States to develop national space weather plans;
- (e) Promoting the maintenance of space weather services and the meeting of key measurement needs;
- (f) Encouraging member States to complete space weather risk and impact assessments;
- (g) Supporting and encouraging new research and the transition to improved operational services.

18. The Expert Group had agreed that the guidelines for the long-term sustainability of outer space activities that related to space weather, in particular guidelines B.16 and B.17, would form the basis for enhanced future global resilience.

19. The Subcommittee took note of the report on the work of the Expert Group and recommended that the Expert Group, which had brought relevant entities together, continue its work in accordance with the recommendations included in the Expert Group's progress report (A/AC.105/C.1/2019/CRP.12).

X. Long-term sustainability of outer space activities

20. In accordance with General Assembly resolution [73/91](#), the Subcommittee considered agenda item 12, entitled "Long-term sustainability of outer space activities".

21. The representatives of Argentina, Australia, Austria, Brazil, Canada, China, France, Germany, India, Indonesia, Japan, Mexico, New Zealand, the Republic of Korea, the Russian Federation, South Africa, Switzerland, the United Kingdom and the United States made statements under agenda item 12. A statement was also made under the item by the representative of Costa Rica on behalf of the Group of Latin American and Caribbean States. During the general exchange of views, further statements relating to the item were made by representatives of other member States.

22. The Subcommittee heard the following scientific and technical presentations:

- (a) "ISO standardization activities for the sustainability of space activities", by the observer for the International Organization for Standardization;
- (b) "Consortium for Execution of Rendezvous and Servicing Operations", by the representative of the United States and the observer for the Secure World Foundation;
- (c) "ESA activities in clean space", by the observer for ESA;
- (d) "Private sector contributions to the long-term sustainability of outer space activities", by the representative of the United States;
- (e) "Encouraging the sustainable exploration of space by means of in-situ resource utilization to mitigate the plume effect", by the observer for For All Moonkind.

23. The Subcommittee had before it the following:
 - (a) Working paper by the Chair of the Working Group on the Long-term Sustainability of Outer Space Activities entitled “Guidelines for the Long-term Sustainability of Outer Space Activities” ([A/AC.105/C.1/L.366](#));
 - (b) Working paper by the Chair of the Working Group on the Long-term Sustainability of Outer Space Activities entitled “Draft guidelines for the long-term sustainability of outer space activities” ([A/AC.105/C.1/L.367](#)).
24. The Subcommittee agreed that it was important to continue work on the long-term sustainability of outer space activities.
25. The Subcommittee noted with appreciation the efforts of the Chair of the Working Group on the Long-term Sustainability of Outer Space Activities, who had guided delegations during eight years of discussions and whose mandate had now come to an end.
26. The view was expressed that the Working Group on the Long-term Sustainability of Outer Space Activities had done crucial and excellent work to promote non-binding practical norms, which was a much-needed exercise in space diplomacy and had contributed to building transparency and confidence among member States.
27. The view was expressed that, in recent years, the work undertaken on the long-term sustainability of outer space activities had influenced the work of the Committee in a considerable way, as it had revitalized the Committee’s negotiating capacity and reinforced an important principle guiding the discussions in Vienna, namely the search for and achievement of consensus.
28. Some delegations welcomed the consensus reached in 2018 on a preamble and 21 voluntary guidelines for the long-term sustainability of outer space activities.
29. Some delegations expressed the view that the preamble and those 21 guidelines on which consensus had been reached, which were contained in document [A/AC.105/C.1/L.366](#), should be adopted by the Committee and referred to the General Assembly for endorsement.
30. Some delegations expressed the view that the preambular paragraphs and the 21 guidelines on which consensus had been reached ([A/AC.105/C.1/L.366](#)) should be presented for adoption by the Committee at its sixty-second session and that at the same session, a mechanism to address various aspects of the long-term sustainability of outer space activities should be established. The delegations expressing this view also noted that the Chair of the Committee and the delegation of South Africa would be willing to convene related informal consultations to work with all interested delegations.
31. The view was expressed that the preamble and 21 guidelines ([A/AC.105/C.1/L.366](#)) should not be considered a final product to be adopted either by the Subcommittee or the Committee, as the Working Group on the Long-term Sustainability of Outer Space Activities had not succeeded in reporting the result of its work as had been mandated. The delegation expressing this view was also of the view that the preamble and 21 guidelines should be considered as guidelines on whose text consensus had been reached, while the remaining seven guidelines ([A/AC.105/C.1/L.367](#)) should be considered as guidelines on whose text consensus could not be reached and for which negotiations should continue. The delegation further expressed the view that work on the guidelines for the long-term sustainability of outer space activities should be continued with patience.
32. The view was expressed that the evolution of and rapid changes in the outer space environment and related technologies made the guidelines for the long-term sustainability of outer space activities increasingly relevant as a tool for upholding the rule of law in outer space.

33. The view was expressed that, to achieve the Sustainable Development Goals, it was crucial to maintain access to outer space. Therefore, implementation of the guidelines was important not only for launching States, but also for all of humankind.

34. The view was expressed that States should press ahead and implement, at the national level, the guidelines on which consensus had been reached, and share their experiences. The delegation expressing this view was also of the view that implementation of the guidelines would encourage the safe and responsible use of outer space and further legitimize the work of the Committee, while increasing the active engagement of member States with that unique body.

35. The Subcommittee noted a number of measures taken or being taken to implement the 21 guidelines on which consensus had been reached under the categories: (a) policy and regulatory framework for space activities; (b) safety of space operations; (c) international cooperation, capacity-building and awareness; and (d) scientific and technical research and development. The measures consisted of, inter alia, revision of relevant domestic legislation; improved registration of space objects; implementation of national space policy directives; conduct of debris research; plans to start operating a new space situational awareness radar and optical telescope system; completed construction of the optical wide-field patrol system for monitoring space assets; participation in a multilateral consortium appointed by ICAO to be a global space weather centre for the provision of space weather advisories; leadership of the Asia-Pacific Regional Space Agency Forum; and public engagement across all media platforms.

36. The Subcommittee noted with appreciation that a lunchtime side event had been held under the title “Guidelines for the Long-term Sustainability of Outer Space Activities: implementation experiences and challenges”. It had been co-organized by Austria, Brazil and South Africa, and supported by SWF. The event had included contributions by panellists representing Brazil, Canada, China, France, Germany, New Zealand and South Africa, and had focused on implementation plans and on related experiences and challenges that States with different technical and regulatory capabilities in the space domain were facing.

37. The view was expressed that States could begin to voluntarily implement the guidelines for the long-term sustainability of outer space activities to the greatest extent practicable, consistent with their needs, conditions and capabilities.

38. The view was expressed that the preamble to the guidelines created a positive, enabling framework within which the guidelines should be interpreted and implemented. The delegation expressing that view also noted that many elements incorporated in the African Space Policy and Strategy were reflected in the preamble and applicable guidelines.

39. Some delegations expressed the view that it would be a considerable challenge to implement guidelines on which consensus had been reached, and that that was particularly true for countries that were emerging participants in space activities. The delegations expressing that view were also of the view that the support of the international community would be essential, as addressing that challenge would require global solutions and the commitment of all countries.

40. The view was expressed that States should be able to decide independently how to implement the guidelines for the long-term sustainability of outer space activities in accordance with their domestic legal regimes, stages of development, technological capabilities and regulatory proficiency, so as to avoid both insufficient regulation and unnecessary excessive regulation of the space industry, taking into account acceptable and reasonable financial and other considerations and the needs and interests of developing countries.

41. Some delegations expressed the view that work should continue on those guidelines on which no consensus had been reached during the mandate of the Working Group on the Long-term Sustainability of Outer Space Activities. In their view, discussions on those guidelines could strengthen the work already done.

42. The view was expressed that, as a complement to the Subcommittee's agenda item on the long-term sustainability of outer space activities – under which member States could share their experiences in implementing the guidelines – it would be appropriate to establish a working group to develop clear procedures for reviewing and updating the guidelines and introducing and considering proposed new guidelines.

43. The view was expressed that, if a new working group was to be established, its mandate should not be restricted to the seven guidelines on which no consensus had been reached, and that it should instead be open to considering new items and ideas, such as space traffic management.

44. The view was expressed that a permanent working group should be established either under the Scientific and Technical Subcommittee or under the Committee on the Peaceful Uses of Outer Space, with an appropriate mandate and with clearly defined and transparent procedures for: (a) reviewing and updating the guidelines on which consensus had been reached; (b) continuing negotiations on guidelines dealing with important issues related to the safety of space operations on whose text the Working Group had not reached consensus during its mandate due to a lack of time; (c) formulating recommendations to Member States with regard to the implementation of the guidelines; (d) considering proposals for the new guidelines; and (e) discussing mechanisms for improving the exchange of information on objects and events in outer space with the ultimate goal of enhancing the safety of space operations.

45. The view was expressed that a permanent working mechanism should be established under the agenda item on the long-term sustainability of outer space activities to resolve new problems and challenges in the governance of outer space activities. The delegation expressing that view was also of the view that such a mechanism should be based on real needs and developments in space technology and should enhance mutual trust and cooperation.

46. The view was expressed that States should be open to resuming their dialogue with other interested States on an initiative that could build on the preamble and the 21 guidelines on which consensus had been reached, as doing so would give political shape to the universal commitment to responsible behaviour in space.

47. The view was expressed that support should be given to proposals made under UNISPACE+50 thematic priority 2 to address the interlinkages between the outcome of the Working Group and the treaties, principles and other instruments under the international legal regime governing outer space activities. The delegation expressing this view was also of the view that support should also be given to the establishment of a mechanism to further address the topic in the Committee.

48. The view was expressed that achieving consensus on approaches and solutions that would provide for the safety and security of outer space activities required real political will. The delegation expressing that view was also of the view that participants in space activities needed, inter alia, to responsibly choose those tools and means – from among those they may use to conduct their activities in outer space – that would ensure the safety of space operations and would prevent harmful interference with the space activities of other States.

49. The view was expressed that, in the future, a set of norms of behaviour and good practices in space would be needed more than ever. It would be necessary to formulate a clear, common vision of present and future challenges and to identify norms, best practices, recommendations or guidelines to improve the space environment, whether in the form of legally binding rules, voluntary rules or measures to enhance transparency and build confidence.

50. The view was expressed that actions by the international community related to the long-term sustainability of outer space activities should be based on the following principles: (a) the Charter of the United Nations and applicable international law, both of which provided an adequate and pertinent legal framework, must be respected in

the development of space activities; (b) the dual nature of space activities should be taken into account, as well as the need to promote the responsible use of space in the pursuit of both civilian and military space programmes; (c) any responses must be effective, pragmatic and sustainable, and must be able to bring about concrete and immediately measurable benefits; and (d) actions by the international community must be part of the search for practices aimed at increasing trust and transparency between actors and at limiting the possibilities of misunderstanding or escalation.

XI. Use of nuclear power sources in outer space

51. In accordance with General Assembly resolution 73/91, the Subcommittee considered agenda item 13, entitled “Use of nuclear power sources in outer space”.

52. The representatives of China, the Russian Federation and the United States of America, as well as the representative of Costa Rica, on behalf of the Group of Latin American and Caribbean States, made statements under agenda item 13. During the general exchange of views, statements relating to the item were also made by representatives of other member States.

53. The Subcommittee noted the tenth anniversary of the adoption of the Safety Framework for Nuclear Power Source Applications in Outer Space. The Commission on Safety Standards of IAEA had also agreed to the Safety Framework at its twenty-fifth meeting, in April 2009. In that connection, the Subcommittee welcomed the fact that some States and an international intergovernmental organization were developing, or considering developing, legal and regulatory instruments on the safe use of NPS in outer space, taking into account the content and requirements of the Principles Relevant to the Use of Nuclear Power Sources in Outer Space and of the Safety Framework.

54. The view was expressed that the Principles and the Safety Framework provided a comprehensive foundation for supporting the safe use of NPS in outer space, and that the guidance provided by the Safety Framework enabled new approaches to safety on the basis of continuing advances in knowledge and practice since the adoption of the Principles. Furthermore, the Safety Framework allowed for States and international intergovernmental organizations to come up with new approaches on the basis of the expansion of knowledge and best practices gained from experience, and therefore continuously improve safety. The delegation expressing that view was also of the view that, to date, the Working Group on the Use of Nuclear Power Sources in Outer Space had not identified any challenges to implementing the Safety Framework that would require any modifications or additions to the Safety Framework. Thus, the practical application of the Safety Framework satisfied the safety intent of Principles and therefore provided sufficient guidance to States and international intergovernmental organizations seeking to ensure the safe development and use of nuclear power in space.

55. The view was expressed that nuclear power could ensure the effectiveness of space programmes in both near- and deep space and that it was a matter of priority to ensure the nuclear and radiological safety of space NPS during the entire cycle of their development and use. In that connection, relevant documents developed under the auspices of the United Nations assisted greatly in the drafting and implementation at the national levels of norms relating to the safety of space NPS.

56. Some delegations expressed the view that, for more than five-and-a-half decades, NPS applications had played a critical role in the exploration of outer space, enabling missions of scientific discovery to destinations across the solar system.

57. Some delegations expressed the view that it was important to continue to study, analyse and evaluate various aspects, practices and regulations pertinent to the use of nuclear power sources in space, and that such activities must be beneficial, not detrimental, to humanity. The delegations expressing that view were also of the view that States were responsible for regulating the use of nuclear energy in space and that

it was their duty to observe the relevant international legal regime. In that connection, and taking into account the Safety Framework, it was important for the Subcommittee to continue addressing the issue through the application of appropriate strategies, long-term planning and the establishment of adequate and updated regulatory frameworks.

58. Some delegations expressed the view that more consideration should be given to the use of nuclear power sources in terrestrial orbits, specifically in the geostationary orbit and low Earth orbit, in order to address the problem of potential collisions of nuclear-powered space objects in orbit and the incidents or emergencies that could be created by the accidental re-entry of such objects into the Earth's atmosphere, as well as the impact of such a re-entry on the Earth's surface, human life and health and the ecosystem.

59. Pursuant to General Assembly resolution 73/91, the Subcommittee, at its 895th meeting, on 11 February, reconvened its Working Group on the Use of Nuclear Power Sources in Outer Space, with Sam A. Harbison (United Kingdom) as Chair.

60. The Working Group on the Use of Nuclear Power Sources in Outer Space held three meetings. At its [...] meeting, on [...] February, the Subcommittee endorsed the report and recommendations of the Working Group.

XII. Space and global health

61. In accordance with General Assembly resolution 73/91, the Subcommittee considered agenda item 14, entitled "Space and global health".

62. The representatives of China, Germany, India, Indonesia, Japan, the Russian Federation, Switzerland and the United States made statements under agenda item 14. During the general exchange of views, statements relating to the item were also made by representatives of other member States.

63. The Subcommittee heard the following scientific and technical presentations:

(a) "Global health, the progress of French space applications and developments", by the representative of France;

(b) "Australian initiatives for capacity-building and knowledge translation from space technologies to global health", by the representative of Australia.

64. The Subcommittee had before it the following:

(a) Working paper by the Chair of the Working Group on Space and Global Health entitled "Proposed multi-year workplan of the Working Group on Space and Global Health of the Scientific and Technical Subcommittee" ([A/AC.105/C.1/L.376](#));

(b) Conference room paper containing a proposal by the Chair of the Working Group for a tentative draft questionnaire of the Working Group on Space and Global Health ([A/AC.105/C.1/2019/CRP.9](#)).

65. The Subcommittee noted a broad array of activities relevant to space and global health, such as telemedicine, space life sciences, space technologies, tele-epidemiology and disaster management (including responding to epidemics). The Subcommittee acknowledged the contribution of space science, space technology and space applications to the prevention and control of diseases, the promotion of human health and welfare, the addressing of global health issues, the advancement of medical research, the advancement of health practices and the provision of health-care services to individuals and communities.

66. Pursuant to paragraph 9 of General Assembly resolution 73/91, the Subcommittee, at its 895th meeting, on 11 February, convened its Working Group on Space and Global Health, with Antoine Geissbühler (Switzerland) as Chair.

67. The view was expressed that there was a need for enhanced inter-institutional and interdisciplinary cooperation and coordination among all stakeholders, such as

United Nations entities, relevant intergovernmental and non-governmental organizations and the medical and space communities, for the attainment of the health-related goals of the 2030 Agenda for Sustainable Development, and that Geneva could be the ideal location to host a platform for such cooperation and coordination.

68. The view was expressed that the establishment of the Working Group on Space and Global Health should contribute to the expansion of access to health services, in particular in developing countries with isolated and difficult-to-reach areas.

69. The view was expressed that the Committee on the Peaceful Uses of Outer Space should work closely with the World Health Organization and the World Organization for Animal Health to prevent and mitigate crises caused by interaction between humans, animals and environment.

70. The Subcommittee noted with satisfaction that 44 scientists from 16 developing countries involved in the Belt and Road Initiative had taken part in a two-week training course on space and global health organized by China in April 2018.

71. At its [...] meeting, on [...] February, the Subcommittee endorsed the report of the Working Group on Space and Global Health, which is contained in annex III to the present report.
