



General Assembly

Distr.: General
15 November 2024

Original: English

**Committee on the Peaceful
Uses of Outer Space**
Scientific and Technical Subcommittee
Sixty-second session
Vienna, 3–14 February 2025
Item 12 of the provisional agenda*
Space and Global Health

Report on the United Nations/World Health Organization Regional Conference on Space Technology for Advancing Global Health

(Vienna, 23–25 October 2024)

I. Introduction

1. On 12 December 2022, the General Assembly adopted resolution [77/121](#) on international cooperation in the peaceful uses of outer space, in which it took note of the report of the Working Group on Space and Global Health of the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space on the work conducted under its multi-year workplan for the period 2019–2022,¹ noted with satisfaction the establishment of the Space and Global Health Platform, based in Geneva, to promote effective collaboration on space and global health issues among Member States and United Nations system entities, in particular the World Health Organization (WHO) and the Office for Outer Space Affairs, as well as international organizations and relevant actors, and welcomed the establishment of the Space and Global Health Network.
2. On the same date, the General Assembly adopted resolution [77/120](#) on space and global health, in which it agreed to promote capacity-building events, to be organized by United Nations entities and other relevant actors, with the objective of further promoting awareness of and engagement with regard to the important contribution of space science and technology in the health domain.
3. In its resolution [78/72](#) of 7 December 2023, the General Assembly requested the Office for Outer Space Affairs to strengthen, within existing resources, capacity-building and networking in Africa, Asia and the Pacific and Latin America and the Caribbean, through regional technical cooperation projects, and to support field projects for strengthening collaboration between the space and global health sectors as an efficient strategy for making better use of space science and technology

* [A/AC.105/C.1/L.418](#).

¹ [A/AC.105/1202](#), annex III, appendix I, and [A/AC.105/C.1/121](#).



for access to global health for beneficiary States and taking better advantage of opportunities offered by bilateral or multilateral collaboration.

4. In accordance with the above-mentioned resolutions, the United Nations/World Health Organization Regional Conference on Space Technology for Advancing Global Health was co-organized by the Office for Outer Space Affairs and WHO in collaboration with the Space and Global Health Network and with the support of the European Space Agency (ESA). The Conference was held in Vienna from 23 to 25 October 2024.

II. Background and objectives

5. The Conference provided a forum for discussion on the areas identified by the Working Group on Space and Global Health and was an opportunity to increase awareness and build capacity among attendees in three areas of interest in which space technologies have been shown to provide significant contributions to global health:

(a) Cases involving the use of geospatial information and space applications for health;

(b) Space and health data;

(c) Capacity-building for enhancing the use of space for global health.

6. To address the objectives of the discussions on the aforementioned areas in the time available, the Conference included keynote addresses and presentation sessions, and was streamed online to maximize its impact as a capacity-building opportunity. Two discussion sessions open to all participants were held on the last day of the Conference, one on the development of a multidisciplinary space and global health curriculum and the other dedicated to discussing the recommendations put forward at the Conference.

III. Attendance

7. A total of 274 individuals from 56 countries registered for the event; of that total, 65 individuals (30 women and 31 men) were selected by the programme committee and invited to participate. The final number of in-person participants was 57, and funding was provided by the Office for Outer Space Affairs and ESA to 14 participants (8 women and 6 men).

8. Funding support was provided to participants from Argentina, Bolivia (Plurinational State of), Brazil, Chile, Colombia, Ecuador and Peru, who represented Governments, industry and academia, and participants from the United States of America who had pan-American regional expertise. Owing to visa-related issues, the participant from Ecuador was not able to attend.

9. Applicants from the following States were invited to attend in person: Algeria, Argentina, Australia, Austria, Belgium, Bolivia (Plurinational State of), Brazil, Canada, Chile, China, Colombia, Czechia, Ecuador, El Salvador, Ethiopia, France, Germany, Hungary, India, Iran (Islamic Republic of), Italy, Mexico, Nigeria, Panama, Paraguay, Peru, Poland, Slovakia, Switzerland, Uganda, United Kingdom of Great Britain and Northern Ireland and United States.

10. Presentations were delivered by 35 speakers representing space agencies, academia, industry and civil society. The Ambassadors of El Salvador, Mexico, Panama and Paraguay and representatives of the Pan American Health Organization (PAHO) and WHO also participated in and delivered presentations at the Conference.

IV. Programme of activities

11. The programme consisted of four main thematic segments: the first on challenges at the local, national and regional levels, which included a diplomacy session; the second on the importance of data; the third on the benefits of space for health; and the fourth on the space and global health curriculum.

12. The first segment comprised three sessions aimed at enhancing understanding of the current status of and needs and opportunities in efforts relating to space for health in Latin America and the Caribbean. The first session was the diplomacy session, in which the Ambassadors of El Salvador, Mexico, Panama and Paraguay delivered presentations on activities and landmark projects being carried out in their respective countries and in the region and explored future opportunities. The other two sessions focused on challenges at the local, national and regional levels.

13. The second segment was focused on the importance of data and comprised four sessions aimed at highlighting how space data support various applications for global health. In particular, the sessions were focused on, respectively, how space data can be used in efforts to address vector-borne diseases, how space data and satellite communications can support health applications in the event of disasters, providing an overview of geospatial information applications, and the use of space data for environmental health.

14. The third segment was aimed at providing an overview of spin-off and downstream services relating to space technology, data and infrastructure in support of global health, featuring insights from both the public and private sectors. The discussions highlighted innovative applications and focused on challenges encountered in integrating space innovations with healthcare systems, the potential of space-driven solutions for addressing health issues, and the importance of interdisciplinary research in advancing space-based healthcare applications.

15. The fourth segment provided an opportunity for discussion on the development of the multidisciplinary space and global health curriculum.

16. In addition, a keynote speech was delivered to set the scene, providing participants with background information on the Conference and the activities conducted by the Office for Outer Space Affairs, the Committee on the Peaceful Uses of Outer Space and the General Assembly in the context of space and global health.

A. Opening ceremony and setting the scene

17. In her opening remarks, the Director of the Office for Outer Space Affairs highlighted the pivotal role that the Office plays in facilitating the integration of space-based solutions into efforts to achieve the Sustainable Development Goals, including Goal 3 (Ensure healthy lives and promote well-being for all at all ages). In that context, she underscored the responsibility of the Office in raising awareness of the vast potential of space technologies to drive positive change on our planet. She requested Member States to provide support to enable the delivery of concrete results, and expressed her hope that Member States would work together to create an environment in which the Office was enabled to effectively mobilize and share the expertise and resources required to translate the use of space technologies into meaningful results on the ground, in particular for the purposes of achieving public health objectives.

18. The representative of WHO provided a detailed analysis of the organization's efforts to tackle the complex health challenges facing humanity, underscoring the critical role that data analytics, technology and, indeed, space technology play in addressing those multifaceted issues. He highlighted the significance of the partnership with the Office for Outer Space Affairs and the importance of the Conference in shedding light on the interconnections between global health and the opportunities

presented by space-enabled innovations, placing particular emphasis on the implications for the Latin American and Caribbean region.

19. The representative of ESA expressed his appreciation for the initiative taken by the Office for Outer Space Affairs in organizing the Conference, which he viewed as representing a crucial step towards translating General Assembly resolution 77/120 on space and global health into tangible reality. He noted that ESA had been eager to contribute its resources, specifically funding, to enable the participation of attendees from the Americas region, thereby fostering progress towards the achievement of the Sustainable Development Goals, including Goal 3 (Ensure healthy lives and promote well-being for all at all ages), and the full implementation of Assembly resolution 77/120, in the region.

20. The representative of the Space and Global Health Network underscored the role of the Network in bridging the gap between space technologies and the health sector. She welcomed the Conference, noting that it provided a timely opportunity to deepen connections with regional stakeholders. The Network had also made progress in implementing recommendations from the United Nations/WHO International Conference held in the previous year, including with regard to the ongoing work to develop a multidisciplinary space and global health curriculum.

21. The opening ceremony was followed by an interactive discussion touching on the resolution of space-derived data needed by the health community and the resolution of the publicly available remote sensing data being provided by space agencies.

22. In the course of the scene-setting presentation, the representative of the Office for Outer Space Affairs provided an overview of the broad range of applications of space science and technology for global health. She also spoke about the work that had been carried out in the area of space and health by the Committee on the Peaceful Uses of Outer Space, the implementation of General Assembly resolution 77/120 on space and global health, and the long-term strategy on space and global health for the period 2025–2035,² as well as the organization of the Conference.

B. Session 1. Diplomacy session: opportunities, needs and challenges

23. The first session was moderated by the Director of the Office for Outer Space Affairs and included interventions by the Ambassadors of El Salvador, Mexico, Panama and Paraguay in their capacity as permanent representatives to the United Nations (Vienna).

24. The Ambassador of El Salvador recognized the importance of space technologies as essential tools for global health, highlighting their contribution to the advancement of telemedicine and healthcare. She underscored the crucial role of international cooperation in maximizing the benefits of space technology for health. She also emphasized the importance of sharing experiences, challenges encountered and lessons learned by means of conferences and side events aimed at spotlighting the topic of space and health, and of providing support for capacity-building in developing countries. The Ambassador underscored the commitment of El Salvador to facilitating the provision of health services to its population and curating tools for telemedicine, as exemplified by the “Dr. ISSS” app, which is a means for the country to expand access to medical consultations.

25. The Ambassador of Mexico emphasized his country’s commitment to enhancing collaboration in the areas of health and space technology. Several successful projects were highlighted, including a “space pharmacy” project focused on the development of drugs and vaccines in simulated microgravity conditions, as were a number of diverse outreach activities and publications. The Ambassador stressed the need to address two primary challenges: the challenge of bringing specialized infrastructure,

² A/AC.105/C.1/127.

and the challenge of bringing trained personnel, to Mexico. The Ambassador suggested that, to overcome those hurdles, regional and international collaboration was needed to leverage capabilities and resources. He also emphasized the sharing of knowledge and technology. He noted that the Convention Establishing the Latin American and Caribbean Space Agency had entered into force on 27 October 2024, marking a significant milestone in regional collaboration efforts.

26. The Ambassador of Panama welcomed his country's entry into the space community through collaboration with the Office for Outer Space Affairs. He mentioned specific milestones, including the donation of a Meade telescope by the Embassy of France in 2004 and the promotion of space-related sciences by the National Secretariat of Science, Technology and Innovation of Panama. The Programme for the Utilization of Space for National Development was aimed at boosting the economy through the use of space and through technological development and education. A road map had been developed for enhancing access to health services through advanced technologies. Panama had guaranteed that it would invest 1 per cent of its gross domestic product in science and research through its adoption of Bill No. 98. The National Digital Transformation Strategy positioned Panama as an innovation hub in healthcare by leveraging artificial intelligence and telemedicine to ensure equal access to quality healthcare.

27. The Ambassador of Paraguay highlighted his country's efforts to connect space technology with national strategies and policies in order to achieve the Sustainable Development Goals. International cooperation was crucial for Paraguay, as an emerging economy and landlocked country, in its efforts to tackle global challenges and enhance global health. Technological advancements had contributed to improvements in various sectors, including the agricultural sector, by enabling the optimization of the use of agrochemicals. However, owing to its vulnerability to natural disasters, Paraguay relied on space-based observation for disaster preparedness. The Ambassador emphasized knowledge-sharing and partnerships as essential to building capacity and delivering healthcare services, citing an app used for monitoring rates of dengue infection. He proposed key policies to ensure the effective integration of initiatives in the areas of space and health.

28. After the presentations, participants engaged in a discussion in which they addressed several aspects of efforts undertaken in the area of space for global health at the national and regional levels.

29. The Director of the Office for Outer Space Affairs highlighted the role of the coronavirus disease (COVID-19) pandemic in boosting the space and satellite sector and drawing attention to the need to bridge the digital divide. She emphasized that there was a need for plans and political will in order to overcome that divide, and suggested that space solutions must be embedded by design in policymaking. She provided the example of a recent forest fire in Brazil to further underscore the importance of the application and coordination of geographic information systems (GIS).

30. The Ambassador of El Salvador emphasized the lack of awareness of the importance of space technologies for health and how access to such technologies could be improved. She highlighted the importance of uniting efforts and collaborating in order to complement efforts to develop sustainable and efficient policies. Lastly, she underscored that a lack of awareness of the importance of space technologies for health resulted in a lack of investment.

31. The Ambassador of Paraguay stated that the lack of awareness of the importance of space technology was causing the gap between developed and developing countries to widen. He highlighted that access to space technologies was a major challenge. As a solution, he emphasized the importance of empowerment, education, strengthening the capacity of international organizations to facilitate knowledge-sharing, and raising awareness of the importance of space technology.

32. The Ambassador of Mexico highlighted the divide between developed and underdeveloped countries, as well as the inequality within countries such as Mexico. He emphasized that a large percentage of the population needed higher education programmes and coexisted with a small percentage that had received higher education. He highlighted that, although there were highly recognized researchers and scientists in Latin America, there was a budget gap.

33. The Ambassador of Panama emphasized the need to secure a budget for science and technology, and the challenge of providing education. He underscored the need to strengthen international cooperation and capacities, referring to the Office for Outer Space Affairs as the appropriate body to lead such efforts, including in the area of space for global health.

34. The Director of the Office for Outer Space Affairs summarized the contributions of the participants, highlighting the need to promote greater awareness and understanding, especially at the policymaking level. She emphasized the importance of reducing dependencies by empowering local and national action, and of the role of younger generations in holding politicians accountable.

C. Session 2. From national to local: health systems and challenges

35. The second session was focused on the integration of information systems and geospatial intelligence to address public health challenges at both the national and local levels. Presentations by speakers from the District Health Secretariat in Bogotá, Colombia, the Ministry of Health of Chile, PAHO and the National Institute of Health of Peru covered a range of topics, from improving health governance to enhancing community well-being through spatial analysis.

36. The speaker from the Office of the Undersecretary for Public Health of the District Health Secretariat in Bogotá, Colombia, presented the “More Well-being” (“Más Bienestar”) model, which was focused on primary social care, and highlighted that most variables of determinants of health were outside the scope of the health system data. He emphasized the importance of integrating social and health responses through the use of intersectoral data for decision-making and governance. A master database had been created to integrate data from various sectors, such as data relating to education, social integration, emergencies and homelessness, at the individual, family and community levels.

37. The speaker from the Primary Care Division of the Ministry of Health of Chile highlighted the importance of comprehensive territorial analysis. That approach considered variables such as gender, poverty, historical memory, language barriers and time. The analytical space component involved descriptive analysis and management to address waiting lists, proximity to health centres and the challenges of delivering health care services to rural areas. A case study from the Municipality of Navidad demonstrated a healthcare referral map that could be changed on the basis of time, cost and cultural considerations.

38. The speaker from PAHO described the Organization’s collaboration with the National Immunization Programme of the Plurinational State of Bolivia to estimate the total population of the country; the estimates included stratification by age and five-year age group in each catchment area, using multiple layers of open-source data from geospatial and population sources. The estimates were validated through a microcensus conducted in five municipalities. Satellite images from Meta and the WorldPop data for 2020 corresponded to field data. Images from Meta were particularly accurate in estimating the distribution of the population by sex. Field data indicated that there were fewer children under the age of 5 years than both sources had estimated. PAHO estimates were used to improve the reach and effectiveness of vaccination operations in the Plurinational State of Bolivia.

39. The speaker from the National Institute of Health of Peru reported that Peru focused on increasing access to health services for women, particularly in areas with

large Indigenous populations. A cost-surface model was developed using geospatial data on elevation, transportation routes and rivers. An analysis using the model revealed significant gaps in access to healthcare; it was found that almost half of the population in two Indigenous communities lived more than an hour away from a health centre, which highlighted the need for improved access to health infrastructure and health professionals.

D. Session 3. From regional to national: space contributions and challenges

40. The third session centred on the contributions of space technology to global health and the challenges faced in implementing solutions involving space technology at both the regional and national levels. Presentations were delivered by the representatives of ESA, the National Institute for Space Research (INPE) of Brazil and the National Commission on Space Activities (CONAE) of Argentina.

41. The representative of ESA provided an overview of the Agency's health-related activities under the Earth Observation for Health (EO4Health) initiative. ESA collaborated with non-governmental organizations, the National Aeronautics and Space Administration (NASA) of the United States, the Japan Aerospace Exploration Agency, the Food and Agriculture Organization of the United Nations, the Office for Outer Space Affairs and WHO. ESA focused on improving public health through efforts to address climate change, efforts to develop satellites, such as the European Union Copernicus programme, and future missions to gather new data. He highlighted the importance of satellite building to the work of ESA at the global level, including the Copernicus programme. Future missions would be aimed at collecting new data using satellites, with a focus on land use data in epidemiological research and air quality applications.

42. The speaker from INPE provided an overview of the National Commission's research on water-borne diseases, emphasizing its mission to operate satellites, map wildfires and monitor environmental indicators. The presentation focused on health surveillance, including epidemiology and the monitoring of environmental health and sanitary conditions. He highlighted the use of satellite data to study diseases such as leptospirosis and dengue fever, and discussed data sources available in Brazil, such as the Information System for Notifiable Diseases (SINAN) and the Brazilian Institute of Geography and Statistics (IBGE). Lastly, he showcased examples of research and epidemiological models and introduced the Open Network for Water-Related Diseases.

43. The representative of CONAE introduced the National Commission's activities and initiatives. CONAE focused on landscape epidemiology, environmental quality, agriculture and emergencies. Automatic tools for dengue surveillance were used to predict dengue outbreaks using climate data. Ongoing research was focused on exploring the impacts of climate and land use on disease transmission and the connections between food environments, malnutrition and renal disorders. The speaker also discussed postgraduate training programmes, highlighting the commitment of CONAE to advancing knowledge-building in those areas.

E. Session 4. Importance of data: space applications to address vector-borne diseases

44. The fourth session was focused on the use of space applications to address vector-borne diseases and featured presentations by speakers from the Public Health Agency of Canada, Dipteron and Stanford University, United States, who highlighted innovative approaches to disease mapping and outbreak management.

45. The representative of the Public Health Agency of Canada presented a habitat suitability model for the tick vector of Lyme disease in eastern Canada. She explained

that machine learning-based ecological niche models were being used to link tick surveillance data to environmental predictor variables derived solely from Earth observation data in order to map tick populations. The modelling approach was extendable to other areas and could be updated with new Earth observation data. One application of the model was to provide accurate Lyme disease risk maps for use in public health-related efforts, which was especially important as the tick population expanded into new areas affected by climate warming.

46. The speaker from Stanford University delivered a presentation on the impact of land use changes on vector-borne diseases such as malaria. She noted that it had been shown that deforestation increased the incidence of malaria. A study had hypothesized that gold mining had triggered malaria infection in the Yanomami population in South America and had led to a 300 per cent increase in malaria cases. Satellite images had been used to monitor forest, mining and farming cover from 2003 to 2021. The images had revealed that mining areas had expanded to 1,500 km² in 2021, and the expansion had been correlated with 20,000 cases of diagnosed malaria.

47. The representative of Dipteron made a presentation on the application developed by the company to serve as an early warning system for dengue outbreaks in Brazil. The system involved gathering data and training an artificial intelligence model to predict outbreaks up to four weeks in advance. Hosted on a smart city platform in the cloud, the system aided in monitoring, planning and supporting emergency management logistics and helped to reduce the costs associated with remediation actions and campaigns.

F. Session 5. Importance of data: health and disasters

48. The fifth session was focused on showcasing examples of the use of space solutions in support of health and emergency management in the context of disasters, and presentations were delivered by representatives of the non-governmental organization Friendship, WHO, the Office for Outer Space Affairs and the European Centre for Disaster Medicine, San Marino.

49. The representative of Friendship made a presentation on the non-governmental organization's healthcare initiatives. She noted that Friendship took a holistic approach to integrating technology, using mobile healthcare units and community-based interventions to reach underserved areas. Maternal and child health services were prioritized in order to address critical needs. The organization's work had reached 23 million people, in particular during the refugee crisis in Bangladesh. Its focus on sustainability and capacity-building in local health systems had ensured long-term impacts, demonstrating the importance of Friendship's efforts in addressing environmental challenges and improving the health of communities.

50. The representative of WHO delivered a presentation on the role of GIS technology in advancing global health initiatives. GIS technology had been utilized in efforts in Gaza to support the establishment of healthcare facilities, evacuations and deployments of emergency medical teams. GIS tools were used to locate and track individuals in order to deliver medicine and essential items to them despite logistical challenges. Improvements had been made to legacy GIS software, such as AccessMod. The speaker emphasized the need to address disaster and climate resilience in the context of health, highlighting the importance of sustainability, capacity-building and leveraging telemedicine in complex environments.

51. The representative of the Office for Outer Space Affairs made a presentation on the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER). She noted that the platform, established in 2006, provided Member States with access to space-based information and technology for disaster management. The platform was focused on using Earth observation data and satellite services throughout the disaster management cycle. The speaker highlighted that geo-information was crucial in disaster management and explained that the work of UN-SPIDER involved knowledge management, capacity-building,

technical advisory missions and international cooperation, in particular in developing countries.

52. The representative of the European Centre for Disaster Medicine, San Marino, delivered a presentation on the potential of the use of space technologies to address global health challenges. He highlighted the crucial role of space technologies in climate-related disaster response efforts, emphasizing the importance of satellite communications for connectivity and coordination during emergencies. The speaker noted that remote sensing was recognized as a powerful tool in disaster management, as it enabled rapid assessment and response. He discussed how the integration of advanced technologies such as drones and GIS could enhance the effectiveness of disaster response efforts.

G. Session 6. Importance of data: geospatial information applications

53. The sixth session was focused on the utilization of geospatial information to enhance public health initiatives and featured presentations in which speakers from PAHO, Universidad Católica Boliviana San Pablo (Plurinational State of Bolivia), Universität Witten/Herdecke (Germany) and ESA showcased current efforts and innovative solutions.

54. The second speaker from PAHO provided an overview of geospatial technologies in the Americas. She emphasized the importance of computer vision in health initiatives, which leveraged artificial intelligence to detect objects and infrastructure, such as dumpsites, using deep learning methods. Geolocation and satellite information were highlighted as tools to extend the reach of primary care services, identify underserved regions and estimate population counts. It was also noted that geospatial data were used to detect heat island risk areas and inform targeted intervention strategies for addressing climate hazards.

55. The speaker from Universidad Católica Boliviana San Pablo made a presentation on the status of the use of satellite images for health monitoring in the Plurinational State of Bolivia, highlighting that the purposes for which satellite images were used had expanded beyond weather forecasting to include health-related applications. It was noted that there was a significant gap with regard to collaboration between satellite researchers and health practitioners; for example, there were only six publications relating to satellite research and health in the country, mostly connected with space-related conferences, which underscored the need for better information-sharing and engagement. The speaker proposed a communication strategy to bridge that gap and improve collaboration between health stakeholders and satellite researchers in the Plurinational State of Bolivia.

56. The speaker from Universität Witten Herdecke emphasized the risks faced by infants born at high altitudes, which included congenital heart disease and neonatal pulmonary hypertension due to impaired oxygen delivery. A study had shown that there were significantly higher rates of pulmonary hypertension and sudden infant death among newborns born at high altitude who were born to migrants from lowland areas, compared with newborns born to mothers originating from high-altitude regions, who were better adapted to high altitudes. The speaker proposed using space technology to monitor migration flows to high-altitude regions, suggesting that targeted interventions such as nationwide neonatal cardiac screenings could reduce newborn mortality and would align with target 3.2 of the Sustainable Development Goals.

57. The speaker from ESA gave a presentation on the Agency's collaboration with health authorities involving the utilization of cloud-based geospatial services and satellite data for public health applications such as digital twinning and the European Union Destination Earth (DestinE) platform. She highlighted the use of satellite data in models to track the incidence of diseases, specifically citing cases in Brazilian states in which there were varying rates of dengue fever. The speaker placed emphasis on platforms that enabled the analysis of data without requiring massive data

downloads, which provided a significant advantage for communities that used devices with limited capabilities.

H. Session 7. Importance of data: environmental health

58. The seventh session was focused on the use of space solutions to address the impact of environmental factors on public health and featured presentations by representatives of CONAE, RTI International, the Ministry of Communications and Technology of Somalia and the Office for Outer Space Affairs.

59. The speaker from CONAE presented two projects that leveraged satellite data and atmospheric modelling to understand the behaviour of pollution in Argentina. The focus was on environmental quality and health risks. Challenges in collecting data on asthma and respiratory infection were addressed through surveys. The importance of integrating social, cultural and environmental data for effective decision-making was highlighted. The projects discussed involved the production of risk maps of acute and chronic exposure to pollutants in the areas surrounding the Paraná river delta and in the Province of Córdoba, in Argentina. Collaboration across institutions and disciplines was emphasized as key to achieving results.

60. The speaker from RTI International, a non-profit research institute, presented a study in which ecological modelling was used to identify areas in Brazil and Colombia that were potentially susceptible to outbreaks of the vaccinia virus (VACV). It was explained that the researchers had compiled geospatial data related to 87 confirmed outbreaks, using the Maxent software application and Google Earth Engine to generate an ecological niche model. The model had predicted all outbreak locations and identified additional susceptible areas. It was found that environmental factors such as precipitation and mean temperature had influenced transmission. The study highlighted the importance of integrating ecological data in managing public health risks associated with zoonotic pathogens such as VACV.

61. The speaker from the Ministry of Communications and Technology of Somalia underscored the significance of the Conference in relation to spatial data and satellite remote sensing, highlighting their potential as tools to address the pressing challenges faced by Somalia. He noted that climate-related disasters in Somalia, such as floods and droughts, had disproportionately affected local communities. The geography of the country's mountainous regions and rural areas posed significant obstacles in accessing critical information and resources, which demonstrated the need for the effective use of satellite data to overcome such difficulties. He emphasized the potential of the use of spatial data and remote sensing to improve the delivery of medical services in hard-to-reach areas, underscoring the importance of those tools for improving response efforts.

I. Session 8a. Benefits of space for health (first part)

62. Session 8a was focused on the benefits of space technology and applications for health and featured presentations by representatives of NASA, the United Kingdom Space Agency and the Aerospace Medical Association.

63. The speaker from NASA highlighted the resources of his organization and their applications in global health. Cutting-edge technologies such as 3D printing and air quality monitoring, as well as open-access data, were showcased. His presentation was focused on minimizing mass and power consumption, tracking hazards in spaceflight and standardizing geographic information systems. He also discussed the importance of data integrity, clinical decision support systems and holographic assistant technology in enhancing team communication. Open data access was deemed crucial for research purposes, and that was supported by numerous experiments conducted aboard the International Space Station.

64. Two speakers from the United Kingdom Space Agency delivered a presentation on revolutionizing healthcare services in the United Kingdom through a public-private partnership approach. The first speaker outlined related challenges and the need for innovative solutions, highlighting space technologies as a key component. The second speaker presented three case studies, on the CliniTouch Vie platform, the Odin Medical Earth Scan service and the Philips Tempus Pro monitor, respectively, all of which involved cutting-edge approaches, such as the use of air pollution data, satellite communications and artificial intelligence, to improve patient outcomes, in line with the Sustainable Development Goals, and were facilitated through a public-private partnership approach.

65. The speaker from the Aerospace Medical Association shared her experience leading a mission to the North Pole, a remote area devoid of civilization. The mission connected with local Indigenous populations, measured environmental factors and explored sustainable practices. Satellite communications played a key role in managing medical emergencies and mapping surroundings. The mission focused on building capacity rather than providing resources, empowering local populations with knowledge and skills and identifying solutions for both Earth and space missions.

J. Session 8b. Benefits of space for health (second part)

66. Session 8b was focused on the private sector perspective on the intersection of space and health, and comprised presentations by representatives of the Access Space Alliance, SpaceABC, Vinci Power Nap, and the National Institute for Nuclear Physics of Italy and the European Organization for Nuclear Research (CERN).

67. The speaker from the Access Space Alliance discussed ways to leverage space technologies for public health, including for disease monitoring and substance detection. He highlighted the socioeconomic benefits in that regard and suggested the use of a cost-benefit analysis approach. However, he noted that private space actors faced significant challenges in creating a viable business model, which limited their impact on efforts to improve public health. That situation, nevertheless, created an opportunity for public sector decision makers to invest in space-based initiatives that prioritized the advancement of public health over profit.

68. The speaker from SpaceABC emphasized the importance of the private space sector for public health using practical examples, such as the development of the world's smallest dosimeter. She advocated for private space actors to take the initiative in furthering advancements in healthcare. International and national space business incubation programmes played a catalytic role by providing financial incentives and expertise to foster private sector contributions to public health efforts, thereby enabling innovation in areas such as medical research and healthcare monitoring.

69. The speaker from Vinci Power Nap introduced participants to a proprietary technology that allowed people to nap in zero gravity in specially designed neuroarchitectural spaces, aimed at alleviating the effects of pollution on human health. She discussed studies that had been carried out on the frequency of motion and on the pressure, temperature and humidity of air (from ventilators), and the role of those factors in histamine release, as well as the possibilities of neutralizing and preventing histamine release before it led to sepsis. Potential uses for the technology included reducing stress and jet lag and mitigating allergies and respiratory problems, while also improving sleep and cardiovascular and mental health. The speaker listed various medical conditions that the Vinci Power Nap system might help to prevent or alleviate, citing the company's unique approach to healthcare in space and on Earth.

70. The speaker from the National Institute for Nuclear Physics of Italy and CERN discussed his involvement with the Alpha Magnetic Spectrometer, a particle physics experiment module, and space radiobiology research. He highlighted the challenges of interdisciplinary research, noting the complexities involved in integrating diverse fields of inquiry. In addition, he mentioned his work on various educational and

outreach activities designed to promote public awareness and understanding of space-based science and its applications in healthcare and medicine.

K. Session 9. Space and global health curriculum

71. The ninth session was focused on developing the space and global health curriculum and a comprehensive list of relevant use cases to drive capacity-building and awareness-raising efforts. The creation of the curriculum and the list was among the recommendations of the United Nations/World Health Organization International Conference on Space and Global Health, held in Geneva from 1 to 3 November 2023.³

72. During the discussions, it was noted that a transdisciplinary task force had been created in accordance with the conclusions reached by the Space and Health Network at its meetings held on the margins of the sixty-first session of the Scientific and Technical Subcommittee (A/AC.105/C.1/2024/CRP.33). A Chair and a Vice-Chair had been appointed to lead the work of the task force under the relevant workstream; the task force consisted of 28 members. The work that had been initiated included defining the target audiences approved by the task force. It was also noted that the space and global health curriculum was aimed at two target audiences: (a) policymakers and decision makers, who would be introduced to prominent issues relating to space technology and the use of space data to support current and nascent global health initiatives; and (b) students in Master's and PhD programmes, who would be engaged in exploring space technology, data and applications and public health challenges with more granularity.

73. It was further noted that a series of case studies would be used to help students to become familiar with data sources and develop analytical skills. Some of the case studies would likely include the use of satellite imagery to track disease vectors, and to monitor the impacts of climate change, and assess the effect of disasters, on health. Participants discussed several other case studies on such uses, for example, in relation to malaria, vaccination, telemedicine, the climate and the environment, placing emphasis on ensuring the relevance of the curriculum to all regions of the world. In that connection, inclusivity was discussed as a prominent aspect to consider, for example, as a means to ensure that the curriculum would be relevant to people at different stages of life and in various locations, and who spoke different languages.

74. Two massive open online courses would be created to broaden the curriculum's appeal and enhance its efficacy and could be offered as stand-alone resources or as a part of hybrid components that could incorporate in-person workshops and internships. Certification would be an essential component, and a variety of models would be assessed with a view to serving the various audiences in different locations.

75. The action plan for the development of the curriculum included the formation of dedicated subgroups within the task force that would focus on essential deliverables, such as content development, learning pathways, partnership development and the choice of platform.

L. Closing ceremony

76. During the closing ceremony, the representatives of the Space and Global Health Network, ESA, WHO and the Office for Outer Space Affairs noted with satisfaction that the Conference had enabled interactions between emerging and developed space nations and among representatives from academia, civil society, international organizations and space agencies that served to meet the objective of increasing awareness of the contribution of space activities to global health in the Latin American and Caribbean region.

³ A/AC.105/1306.

V. Observations and recommendations

A. Regional networks

77. The importance of inclusivity and accessibility was highlighted by participants, who emphasized that increasing the participation of relevant experts in the Latin American and Caribbean region would be essential for raising awareness and promoting the adoption of innovative solutions. Furthermore, using the official languages of PAHO (English, French, Portuguese and Spanish) as the primary languages in health and space-related events focusing on the region would significantly enhance collaboration and the exchange of knowledge among stakeholders.

78. Participants noted that creating specialized task forces or working groups, led by local experts and using the official languages of PAHO as the primary languages, would facilitate deeper collaboration and exchange among stakeholders. By doing so, networks of such task forces or working groups could foster greater cooperation, the cross-pollination of ideas and the development of innovative solutions in the fields of space and global health.

79. Participants highlighted the need for a dedicated, jointly developed virtual observatory, ideally to be located in a country in the Latin American and Caribbean region, that would serve as a clearing house for research papers, policy briefs, studies and other relevant publications related to space and global health initiatives in the Americas and beyond, including space and health policy think tanks. By creating such an observatory, stakeholders could strengthen collaboration, promote knowledge-sharing and accelerate innovation in the space and global health sectors across the Americas. The observatory would facilitate access to existing knowledge, expertise and resources, allowing users to: (a) identify active researchers and experts in specific areas of focus; (b) explore projects and tools already developed or available in the region; (c) stay up to date with the latest research findings and trends; (d) inform decision-making through evidence-based insights; and (e) contribute to capacity development efforts being carried out in countries of the region.

80. Once the observatory was established, a summary of the information gathered in it, including the number of papers and policy briefs and the number of researchers, projects and tools, would be included in the annual report of the Space and Global Health Network to the Scientific and Technical Subcommittee.

81. Participants emphasized that special consideration should be given to addressing the needs of Indigenous peoples, vulnerable communities and migrants in space and global health initiatives. Those populations and communities often faced unique challenges related to access to health technologies, adequate medical equipment, and healthcare, education and other essential services. The use of space tools and technologies was identified as a key opportunity for improving our understanding of those populations and communities and their needs and priorities, as well as of any specific mechanism of disease transmission and development; disease prevention, preparedness and response; and outbreak mitigation.

B. Integration of space and health

82. Participants emphasized that integrating space and global health considerations into national development plans was critical for achieving sustainable, long-term progress. They recommended that Governments, space agencies and other relevant stakeholders work collaboratively to incorporate the areas of space and global health into broader policy frameworks and to ensure that investments and initiatives align with national priorities and goals. By engaging in joint efforts to identify priorities, share resources and build capacity, those stakeholders could capitalize on the mutual benefits of space and collaboration in the area of global health with a view to driving positive change. In addition, ensuring ministry-level ownership over integrated health

and space-related data would facilitate more informed decision-making, and targeted training programmes could enhance the skills needed to effectively harness and interpret that data.

83. It was noted that further research was needed to use space technologies and other data sources for mapping populations and their movements at adequate spatial and temporal resolutions, which were critical for tracking social and environmental determinants of health and the burden of disease and developing targeted interventions.

84. During the Conference, speakers presented several examples that served to illustrate how climate change, natural disasters and disease vector displacements were affecting the spread of vector-borne and zoonotic diseases specific to the Americas. The importance of addressing the health impacts and implications of climate change was emphasized by participants, who recommended that data and analytics be utilized to better understand and predict those impacts and, in turn, reduce the risks associated with that critical global issue.

85. Participants noted that the incidence of vector-borne diseases could be influenced by land cover and land use patterns and dynamics. In particular, they emphasized that human activities, including those that were illicit, could contribute to the spread of such diseases. As research had shown, some illegal activities that had an impact on the environment could create health problems, for example, research had shown that gold mining in some areas was linked to a threefold increase in the incidence of vector-borne diseases. To address that complex issue, participants recommended taking a cross-cutting approach in which data from multiple sources were integrated, low-latency insights were provided and actions in the field were supported.

86. Participants recommended making available open-source software and tools related to space and global health initiatives, with the goal of increasing their adoption and use by stakeholders worldwide. To assist countries in the uptake of space technologies for health, the preparation of geospatial toolkits adapted to the countries in the region and based on the cases presented during the Conference might be valuable in helping countries to start the process of adopting such technologies in a systematic manner.

87. With regard to the creation of a set of essential health variables that could be captured by space systems and associated applications, as recommended during the previous International Conference, the cases presented during the Conference could be used to generate an initial list of parameters to be monitored by means of space infrastructure and associated applications in order to reduce the risk of there being gaps in monitoring. The list could be iteratively refined in cooperation with stakeholders from the region.

88. It was noted that some of the presentations had provided examples of the use of artificial intelligence models and digital platforms to collect and analyse different historical parameters for the purpose of forecasting health-related events. Participants emphasized the need to work towards the establishment of common frameworks, data structures, tools, architectures and computing capacity while taking into account advances in infrastructure and connectivity.

89. Conference participants recalled the importance of the use of the space environment, including by space stations, for suborbital flights and in preparations for interplanetary missions, as spin-offs derived from such use had demonstrated commercial value.

90. Participants recommended increasing the uptake of telemedicine as an essential means to provide healthcare for all, particularly in the Latin American and Caribbean region. Several cases had been presented on the relevance of telemedicine to underserved, Indigenous and remote communities, and where upscaling was needed. It was further recommended that efforts be made to increase the use of telemedicine and to organize pilot projects that enabled cost-benefit assessments of the use in those communities of diagnostic tools developed for use in space activities.

C. Capacity-building

91. Participants recommended integrating real-world use cases and practical examples from the Latin American and Caribbean region presented during the Conference into curricula being developed for education and training programmes. That would ensure that students, researchers and professionals in the space and global health sectors had access to relevant, hands-on learning experiences that reflected current challenges and opportunities in the field of space and global health. In addition, participants recommended that the curriculum for decision makers include recommended actions that could be taken and estimates of the return on investment provided by those actions. Participants took note of the examples relating to investment and funding that supported local innovation.

92. The active participation of stakeholders in the region was deemed necessary to ensure the relevance of the content developed for the curriculum. Such a collaborative approach would enable the development of tailored curricula that addressed region-specific concerns and promoted the more effective application of knowledge in the field of space and global health in practical settings. Participants recommended organizing specific activities and collaborating with educational institutions, local experts and other key partners to tailor use cases to local contexts, needs and priorities. In addition, ensuring that the curriculum would be multilingual was considered extremely important.

93. Participants recommended the conducting of thorough impact analyses, including cost-benefit analyses, to assess the effectiveness and value of applying space-based technologies in various public health, healthcare and surveillance settings. Such an approach would provide a more comprehensive understanding of the financial, social and economic implications, and enable the determination of the potential return on investment, of using those technologies.
