



**Committee on the Peaceful
Uses of Outer Space****Report on activities carried out in 2019 in the framework of
the United Nations Platform for Space-based Information
for Disaster Management and Emergency Response****I. Introduction**

1. In its resolution [61/110](#), the General Assembly decided to establish a programme within the United Nations to provide universal access to all countries and all relevant international and regional organizations to all types of space-based information and services relevant to disaster management to support the full disaster management cycle by being a gateway to space information for disaster management support, serving as a bridge to connect the disaster management and space communities and being a facilitator of capacity-building and institutional strengthening, in particular for developing countries.
2. At its fiftieth session, the Committee on the Peaceful Uses of Outer Space agreed that progress reports on the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER) and its future workplans should be considered by the Scientific and Technical Subcommittee under a regular agenda item on space-system-based disaster management support.
3. As part of the responsibility of the Office for Outer Space Affairs of the Secretariat for promoting international cooperation in the peaceful uses of outer space, UN-SPIDER fosters knowledge management, builds bridges between communities of providers of space-based information and users of services in the disaster risk management and emergency response communities, and provides technical advisory support to Member States.
4. The 23 regional support offices¹ of UN-SPIDER are hosted by national and regional organizations. The regional support offices provide regional coverage to UN-SPIDER activities from institutions specialized in Earth observation, disaster risk reduction and emergency response.
5. As in previous years, some regional support offices facilitated the participation of their experts in technical advisory and institutional strengthening missions, while others provided content to be uploaded to the UN-SPIDER knowledge portal. Many regional support offices also facilitated the participation of their experts in UN-SPIDER international conferences and the annual meeting of such offices, held in Vienna in June 2019.

¹ Further information is available at www.un-spider.org/network/regional-support-offices.



6. The present report contains a summary of activities carried out under the UN-SPIDER programme in 2019.

II. Activities carried out in 2019

7. The work carried out by UN-SPIDER in 2019 was implemented with the resources allocated through the regular budget of the United Nations and with voluntary and in-kind contributions from Member States and collaborating entities.

8. UN-SPIDER regional support offices, donors and other partners met in Vienna on 18 and 19 June 2019 in the context of the sixty-second session of the Committee on the Peaceful Uses of Outer Space. The meeting served as an opportunity to provide updates on present and upcoming activities and discuss contributions by the regional support offices and partners.

9. As part of its technical advisory support activities (see section A below), UN-SPIDER conducted one technical advisory mission and six institutional strengthening missions. The programme also provided technical advisory support through the generation of tailor-made space-based information to countries that have experienced floods (Cameroon), droughts (Namibia), volcanic activity (Guatemala and Indonesia) and landslides (Cameroon, Colombia and Guatemala).

10. The outreach activities conducted by UN-SPIDER (see section B below) included eight workshops, conferences, training courses and side events organized in China, Germany, India, the Republic of Korea and Switzerland. In addition, the programme organized and contributed to various outreach activities and co-organized with the World Meteorological Organization (WMO) the Second Multi-Hazard Early Warning Conference, held in Geneva on 13 and 14 May 2019.

11. The programme supported emergency responses in several countries and promoted the universal access initiative of the Charter on Cooperation to Achieve the Coordinated Use of Space Facilities in the Event of Natural or Technological Disasters (also referred to as the “International Charter on Space and Major Disasters”) among disaster management authorities of seven countries (see section D below).

A. Technical advisory support

12. The activities carried out in 2019 included one technical advisory mission to Peru and six institutional strengthening missions to Cameroon, Ecuador, Ethiopia, the Lao People’s Democratic Republic, Mongolia and Myanmar.

1. Institutional strengthening mission to Myanmar, 11–15 March 2019

13. This activity was a follow-up activity to the UN-SPIDER technical advisory mission conducted in March 2012 and institutional strengthening missions carried out in 2012, 2016 and 2017. It was supported by the Ministry of Social Welfare, Relief and Resettlement and the United Nations Human Settlements Programme (UN-Habitat).

14. The programme included an advocacy meeting at the ministerial level and two training programmes – one for 25 officials from the Department of Disaster Management of the Ministry of Social Welfare, Relief and Resettlement and one for 25 officials from key line ministries. The programme had an impact at the policy level and enhanced capacity for using space-based technologies for disaster management.

2. Institutional strengthening mission to the Lao People’s Democratic Republic, 18–22 March 2019

15. This activity was a follow-up activity to the UN-SPIDER technical advisory mission conducted in 2015 and the institutional strengthening mission carried out

in 2016. It was supported by the Ministry of Science and Technology, UN-SPIDER regional support offices, the International Water Management Institute and the Asian Disaster Preparedness Centre.

16. The programme contributed to the Association of Southeast Asian Nations workshop on the application of geospatial information on statistical data for sustainable development and the conduct of a national training programme on Earth observation-based mechanisms and tools for assessing flood risk and rapid response during floods. It strengthened the skills of 25 participants and the Lao National Geospatial Information Utilization and Management voluntary community, which was established in 2016 with the assistance of UN-SPIDER, in utilizing emergency response maps.

3. Technical advisory mission to Peru, 1–5 April 2019

17. UN-SPIDER carried out this mission at the request of the National Institute for Civil Defence and the National Aerospace Research and Development Commission and with the support of experts from the National Commission on Space Activities of Argentina, the Agustin Codazzi Geographic Institute of Colombia, the German Aerospace Centre, the Mexican Space Agency and the Federal University of Santa Maria of Brazil.

18. The five-day mission included meetings with high-ranking officers of the National Institute for Civil Defence and the National Aerospace Research and Development Commission, visits to 13 Government agencies and universities, and an inter-institutional workshop with government agencies, universities and non-governmental organizations. The mission took note of the advances by the Commission in its efforts to promote the use of satellite imagery from PeruSAT-1 and other satellites; and in the use of such satellite imagery by the National Institute for Civil Defence and other government agencies in their routine tasks.

4. Institutional strengthening mission to Ecuador, 8–12 April 2019

19. UN-SPIDER carried out an institutional strengthening mission to Ecuador at the request of the National Risk and Emergency Management Service of Ecuador. The Military Geographic Institute of Ecuador, the Agustin Codazzi Geographic Institute of Colombia, the Federal University of Santa Maria and the Ecuadorian Space Institute supported the mission.

20. The mission included a training course that was conducted at the premises of the Military Geographic Institute and targeted 21 participants from various institutions selected by the National Risk and Emergency Management Service. The participants were trained in the use of three UN-SPIDER recommended practices to generate useful information regarding floods, droughts and forest fires.

5. Institutional strengthening mission to Cameroon, 15–19 July 2019

21. UN-SPIDER carried out an institutional strengthening mission to Yaoundé from 15 to 19 July at the request of the Ministry of Territorial Administration. The objective of the mission was to strengthen the capacities of the Department of Civil Protection in using space-based information at all stages of the disaster management cycle.

22. The mission included meetings with the Prime Minister, the Minister of Territorial Administration and the Director and staff of the Department of Civil Protection, and addressed ways to institutionalize the use of space-based information in disaster risk reduction, preparedness, response and recovery efforts, and to promote data-sharing and coordination among relevant stakeholders in the country, especially in emergency response efforts.

23. A two-day workshop on emergency operations centres, organized by the Department of Civil Protection and UN-SPIDER, brought together 52 participants from 36 institutions, including ministries, Government agencies, United Nations agencies, humanitarian organizations and the private sector.

6. Institutional strengthening mission to Ethiopia, 26–30 August 2019

24. At the request of the Government of Ethiopia, UN-SPIDER carried out an institutional strengthening mission to Addis Ababa, from 26 to 30 August to support the country in making use of the benefits of space technology. The mission included meetings with a wide range of stakeholders to identify how space-based information was used in the context of disaster management and drought-monitoring in particular, and to make recommendations in those areas.

25. As part of the week-long mission, UN-SPIDER and the Ethiopian Space Science and Technology Institute convened a national workshop on drought monitoring, forecasting and prediction in Ethiopia using satellite-driven and in-situ-based measured products. The workshop brought together nearly 40 participants from national and international institutions, who discussed the establishment of a drought monitoring team in Ethiopia to develop integrated meteorological, hydrological and agricultural drought forecasting services.

7. Institutional strengthening mission to Mongolia, 2–4 September 2019

26. The UN-SPIDER mission to Mongolia focused on exploring the current usage of space-based and geospatial systems at the National Emergency Management Agency, in order to review progress and provide a follow-up in the context of the recommendations of the report produced following the technical advisory mission, including assistance to become an authorized user of the International Charter on Space and Major Disasters. UN-SPIDER also conducted a one-day national workshop for stakeholders from various ministries and a meeting with high-level officials of the National Emergency Management Agency.

8. Creation of a geospatial dashboard for reporting on targets of the Sendai Framework for Disaster Risk Reduction 2015–2030, Sri Lanka

27. A UN-SPIDER expert visited the Disaster Management Centre of Sri Lanka in order to create a geospatial dashboard. The dashboard identifies indicators of the Sendai Framework that can be supported by Earth observation data and compiles key data sources available in the public domain and within Government agencies in Sri Lanka.

28. Once the data needed for monitoring targets of the Sendai Framework are available, an improved tool may be offered to the South Asia region through ongoing cooperation between the South Asian Association for Regional Cooperation Disaster Management Centre in India and the Office for Outer Space Affairs.

9. Mapping support to Guatemala in relation to the activity of Fuego volcano

29. At the request of the National Coordinating Agency for Disaster Reduction and the National Institute for Seismology, Volcanology, Meteorology and Hydrology of Guatemala, a visiting scientist from Mexico collaborating with UN-SPIDER developed a high-resolution digital elevation model using stereoscopic SPOT 7 satellite imagery for the identification of areas with massive erosion and deposits.

10. Anak Krakatoa volcanic activity

30. The visiting scientist from Mexico collaborating with UN-SPIDER created a ground deformation model using multi-temporal differential interferometry analysis for the Anak Krakatoa volcano in Indonesia in order to identify indicators of volcanic activity that caused a massive landslide in December 2018, which, in turn, triggered a tsunami.

11. Mapping support to Colombia in relation to slope instabilities in June 2019

31. At the request of the National Disaster Risk Management Unit of Colombia, UN-SPIDER mobilized a small team of experts to make use of multi-temporal radar

interferometry in order to assess the instability of a mountain slope that had triggered a large landslide that had affected a major road in Colombia.

12. Mapping support for Cameroon in relation to landslides in November 2019

32. At the request of the Department of Civil Protection of Cameroon, UN-SPIDER conducted a multi-temporal radar interferometry assessment to detect the geological instability of the city of Bafoussam, where a landslide killed 50 people.

13. Mapping support for Guatemala in relation to landslides in November 2019

33. At the request of the National Coordinating Agency for Disaster Reduction, UN-SPIDER also conducted a multi-temporal radar interferometry assessment to detect the geological instability of a neighbourhood in Guatemala City that had been affected by a series of landslides.

B. Outreach and networking activities

34. The present section covers: (a) events organized or co-organized under the UN-SPIDER programme; and (b) contributions to events organized on the initiative of various partner organizations.

1. Events organized or co-organized under the UN-SPIDER programme

(a) Second Multi-Hazard Early Warning Conference, Geneva, 13 and 14 May 2019

35. UN-SPIDER co-chaired the Second Multi-Hazard Early Warning Conference, which was hosted by WMO at its headquarters in Geneva. The Conference was held prior to the 2019 Global Platform for Disaster Risk Reduction.

36. At the event, more than 320 participants from around the world and affiliated to international, regional, national and local public sector, civil society, private sector and academic institutions highlighted the need for better governance, partnerships, communication and science and technology for multi-hazard early warning efforts. UN-SPIDER also co-organized a side event on big data and space applications.

(b) UN-SPIDER expert meeting, Daejeon, Republic of Korea, 10 July 2019

37. The UN-SPIDER expert meeting with the Republic of Korea was held at the Korea Aerospace Research Institute. The meeting was attended by representatives of the Institute, the Ministry of the Interior and Safety, the Ministry of Environment, the Environmental Satellite Centre of the Ministry of Environment, the Ministry of Foreign Affairs and the Ministry of Science, Technology and Information and Communications Technology. The participants discussed how activities related to space and disaster management could be streamlined.

(c) United Nations International Conference on Space-based Technologies for Disaster Risk Reduction on the theme “A policy perspective and commemoration of 10 years of the UN-SPIDER Beijing office”, Beijing, 11 and 12 September 2019

38. The United Nations International Conference on Space-based Technologies for Disaster Risk Reduction on the theme: “A policy perspective and commemoration of 10 years of the UN-SPIDER Beijing office” explored the role of space technologies in contributing to disaster risk reduction strategies, policies and actions, and to meeting global target E of the Sendai Framework.²

² Substantially increase the number of countries with national and local disaster risk reduction strategies.

39. The Conference marked the tenth anniversary of the establishment of the UN-SPIDER office in Beijing. To commemorate the occasion, a booklet was published that highlighted the activities and impact of the office over the past decade.³

40. The two-day long Conference was co-organized by UN-SPIDER and the Ministry of Emergency Management in collaboration with the Ministry of Foreign Affairs, the China National Space Administration and the Asia-Pacific Space Cooperation Organization. Approximately 100 people from 27 countries participated in the event.

41. The report on the International Conference ([A/AC.105/1221](#)) provides a detailed account of its proceedings.

(d) International training course on space-based technologies for disaster risk assessment, Beijing, 5–9 September 2019

42. The training course was hosted by the Regional Centre for Space Science and Technology Education in Asia and the Pacific, based at Beihang University, Beijing, on the margins of the United Nations International Conference on Space-based Technologies for Disaster Risk Reduction. The training was co-organized by the UN-SPIDER Beijing office, the Asia-Pacific Space Cooperation Organization and the National Disaster Reduction Centre of China.

43. Experts from the National Disaster Reduction Centre of China, Delta State University, the International Water Management Institute, Airbus, SuperMap and the Economic and Social Commission for Asia and the Pacific contributed to training that covered the following topics: the application of unmanned aerial vehicles, 3D modelling of images taken by unmanned aerial vehicles, and automatic interpretation of high-resolution remote sensing images based on deep learning for disaster monitoring and loss assessment.

(e) Training course for project managers for the International Charter on Space and Major Disasters, Beijing, 10 September 2019, and Bonn, Germany, 5 November 2019

44. A total of 60 participants in the United Nations International Conference on Space-based Technologies for Disaster Risk Reduction and officials from Chinese Government agencies attended a training course for project managers for the International Charter on Space and Major Disasters. The training was co-organized by the UN-SPIDER Beijing office and the National Disaster Reduction Centre of China and was hosted at the Centre's premises in Beijing. The China National Space Administration supported the training as a member of the International Charter. The training was conducted by experts from the National Centre for Space Studies of France and the Centre for Resource Satellite Data and Applications.

45. Prior to the international conference on the theme "Space-based solutions for disaster management in Africa: challenges, applications, partnerships, held in Bonn in 2019, the International Charter on Space and Major Disasters conducted a training course for project managers that was hosted by the UN-SPIDER Bonn office. A total of 23 participants attended the day-long event, which was led by experts from the German Aerospace Centre and the European Space Agency.

46. The unique feature of the training events was that disaster management officials from various developing countries attended and learned about the importance of the International Charter. Such training events are expected to promote the universal access initiative of the International Charter in developing countries.

³ Available at www.unoosa.org/res/oosadoc/data/documents/2019/stspace/stspace_0_html/19-07423_UN_SPIDER_ebook_spreads.pdf.

(f) International conference on the theme “Space-based solutions for disaster management in Africa: challenges, applications, partnerships”, Bonn, Germany, 6–8 November 2019

47. At the conference, over 100 participants from more than 20 countries discussed the use of space technologies to address the challenges posed by floods, droughts and other natural hazards across Africa. The conference brought together space agencies, national disaster management agencies, international, regional and non-governmental organizations, academic institutions and the private sector. The conference was co-organized by UN-SPIDER and the Center for Remote Sensing of Land Surfaces with the support of the German Aerospace Centre.

48. The event included two panel discussions and several presentations from the space and disaster management communities. During the first panel, experts from space agencies and cartographic institutes discussed space technologies for disaster management in Africa. During the second panel, those working in the area of disaster management discussed the challenges of using such technologies in risk reduction and emergency response efforts.

49. The conference featured a hands-on segment, during which participants had the opportunity to explore a wide range of Earth observation and geospatial solutions to map and analyse floods, droughts, forest fires and other natural hazards through step-by-step exercises.

(g) International training course on space-based information systems for ecosystem-based disaster risk reduction, Roorkee, India, 25–29 November 2019

50. The training focused on the use of techniques for analysing satellite remote sensing image in order to monitor the health of ecosystems and the potential of space-based information in ecosystem-based disaster risk reduction. A total of 36 young research scholars, scientists and professionals from six countries in Asia and Africa attended the course. The training included a visit to a nearby city for scenario generation through the strategic selection of feasible blue-green infrastructure, and provided insight into the role of ecosystems in urban planning and the development of resilient communities.

(h) Regional workshop and capacity-building programme on the role of Earth observation in multi-hazard disaster risk assessment and the monitoring of Sendai Framework targets, Ahmedabad, India, 4–8 December 2019

51. This was the second regional event in South Asia co-organized by the Disaster Management Centre (Interim Unit) of the South Asian Association for Regional Cooperation and UN-SPIDER. It benefited 25 participants belonging to States members of the Association. Experts from UN-SPIDER, the regional support office of the International Water Management Institute and the Centre for Space Science and Technology Education in Asia and the Pacific contributed to the training.

52. The outcome of the activity was enhanced cooperation and sharing of best practices among disaster management agencies and experts in the region, improved engagement in the region and better utilization of space-based and geospatial information in disaster management.

2. Contributions to events organized under other initiatives

(a) 2019 International Academy of Astronautics Planetary Defence Conference, Washington, D.C., 27 April–3 May 2019

53. UN-SPIDER contributed to the session on impact consequences and disaster response and emphasized the need for capacity-building for effective emergency response and disaster management in the event of a near-Earth object threat. The participation of UN-SPIDER in the conference enhanced collaboration between the International Asteroid Warning Network and UN-SPIDER.

(b) Participation in the second Resilient Infrastructure Forum, Bogotá, 4–6 June 2019

54. The second Resilient Infrastructure Forum took place in Colombia on the theme “Towards a safer urban future”. UN-SPIDER described how space-based information could be used to increase understanding of the exposure of coastal urban infrastructure to natural hazards and highlighted the importance of land-use changes leading to more frequent and intense flooding in cities in the region.

(c) Participation in the annual conference of the Global Flood Partnership, Guangzhou, China, 11–13 June 2019

55. The 2019 conference of the Global Flood Partnership was hosted by Sun Yat-sen University in Guangzhou, China, and brought together more than 150 participants from relevant communities. The conference discussed how to best foster dialogue between scientists and users on how to use the products generated by members of the Global Flood Partnership.

(d) 2019 international space training course by the Korea Aerospace Research Institute, Daejeon, Republic of Korea, 11 and 12 July 2019

56. A total of 32 participants from approximately 22 countries attended the training course. UN-SPIDER experts delivered sessions on Earth observation for the Sendai Framework, Sustainable Development Goals and emergency response; and the use of microwave remote sensing analysis to provide support following tsunamis such as the ones that struck Indonesia in 2004 and Sendai, Japan, in 2011.

(e) Twenty-third session of the Intergovernmental Consultative Committee on the Regional Space Applications Programme for Sustainable Development, Bangkok, 27–29 August 2019

57. During the session, Committee members comprehensively discussed the implementation of the Asia-Pacific Plan of Action on Space Applications for Sustainable Development (2018–2030). UN-SPIDER presented the activities of the Office for Outer Space Affairs and UN-SPIDER.

(f) Committee on Disaster Risk Reduction, Bangkok, 28–30 August

58. As a subsidiary body of the Economic and Social Commission for Asia and the Pacific, the Committee on Disaster Risk Reduction is the intergovernmental legislative forum on this topic. UN-SPIDER outlined its efforts in contributing to disaster risk reduction, in particular by promoting the use of space-based information in support of the Sendai Framework.

(g) United Nations Office for Disaster Risk Reduction and International Science Council expert meeting on hazard terminology and classification, Geneva, 22–24 October 2019

59. As part of a project to review hazard terminology, the United Nations Office for Disaster Risk Reduction and the International Science Council conducted the expert meeting to review and update the list of hazards to be considered during the implementation of the Sendai Framework; to discuss and agree on a new template to present information on such hazards; and to agree on the structure and content of the report to be prepared as part of the project. UN-SPIDER took the opportunity to add to the list the hazard entitled “near-Earth object” and the text proposed by UN-SPIDER and the International Asteroid Warning Network to describe this hazard.

(h) Regional Committee of United Nations Global Geospatial Information Management workshop and AfricaGIS conference on the theme “Innovations in geospatial technologies for achieving Sustainable Development Goals in Africa”, Kigali, 18–22 November 2019

60. UN-SPIDER was represented at the AfricaGIS conference in Kigali. In parallel, the Regional Committee of United Nations Global Geospatial Information Management for Africa held an international workshop on operationalizing the Integrated Geospatial Information Framework, at which UN-SPIDER gave a presentation on its work and the work of the Office for Outer Space Affairs. The workshop was attended by representatives of more than 25 African countries and United Nations entities.

(i) Eighth African Space Leadership Congress, entitled “Space science and technology for sustainable development: prospects and challenges of African space development”, Addis Ababa, 2–4 December 2019

61. UN-SPIDER delivered a presentation at the Congress, which was organized by the Ethiopian Space Science and Technology Institute. The event was aimed at promoting the benefits of space science and technology among political leaders, decision makers, academics and researchers. Participants discussed the current status of African space programmes, policies and implementation strategies, the importance of intra-African coordination and collaboration in space science and technology and the role of space in the achievement of the Sustainable Development Goals.

62. UN-SPIDER made use of the occasion to follow up with stakeholders from the Ethiopian Space Science and Technology Institute, the African Union Commission, the National Disaster Risk Management Commission of Ethiopia and others it had met during the institutional strengthening mission to the country in August 2019.

C. Knowledge management

63. Knowledge management is at the core of UN-SPIDER activities. By systematically and continuously compiling the knowledge and available resources held by individuals and institutions, UN-SPIDER aims to transfer lessons learned, highlight innovations and foster collaborative practices. The communities involved in the field of work of UN-SPIDER include many different actors: disaster responders, disaster risk specialists, policymakers, remote sensing experts, space technology providers, academics and researchers.

Knowledge portal

64. The UN-SPIDER knowledge portal (www.unspider.org) is one of the cornerstones of the programme as it hosts information on all activities conducted by the programme as well as by the disaster management, emergency response and space communities.

65. The number of visitors to the portal has continually increased since it was launched. In 2019, the average number of monthly visits to the knowledge portal increased by almost 40 per cent, from 22,000 to around 30,000. By the end of 2019, the number of content items had increased to more than 8,600. The sections with the highest addition rates include the news, events, data sources and institutions sections.

66. To enable a broader audience to access the information, step-by-step procedures, known as recommended practices, were created by the programme and its partners.

67. The Space and Upper Atmosphere Research Commission of Pakistan, which is a UN-SPIDER regional support office, established the following two recommended practices: “flood mapping and damage assessments using Sentinel-2 optical imagery” and “flood hazard modelling”.

68. Airbus Defence and Space established a recommended practice on the use of digital elevation data for storm surge coastal flood modelling. The application of this recommended practice shows the strength of the use of high-resolution digital elevation models when mapping the potential extent of storm surges in coastal areas.
69. The visiting scientist from Mexico developed a recommended practice on mudslides and associated flood detection using Sentinel-1 data. The practice is useful for mapping the extent of massive landslides using radar imagery.
70. The recommended practice on burn severity mapping was updated and improved by the Agustin Codazzi Geographic Institute of Colombia, a UN-SPIDER regional support office. This recommended practice makes use of Landsat 8 or Sentinel-2 optical imagery to design forest restoration plans and identify areas prone to soil erosion.
71. Three background information pages on how to use space-based technologies to address specific hazards, entitled “data applications of the month”, were published. They covered the topics of soil erosion, land degradation and locust monitoring.
72. To facilitate the discovery of relevant content on the UN-SPIDER knowledge portal and encourage users to explore related pages, the website’s information architecture has been improved by creating additional entry points, such as the possibility to browse content by country and natural hazard, which have been categorized using the classification system used by the disaster community.
73. In view of the increasing number of online learning opportunities, UN-SPIDER created a page on the knowledge portal that provides links to third party resources such as webinars and massive open online courses. In addition, lists of relevant instructional videos have been curated on the UN-SPIDER YouTube channel and categorized according to the hazard the video relates to, such as floods and droughts.

D. Support to emergencies

74. As part of its activities, UN-SPIDER facilitated activation of the International Charter on Space and Major Disasters on the following four occasions:
- (a) On behalf of the United Nations Development Programme country office in Zimbabwe owing to Cyclone Idai, which struck eastern Zimbabwe on 14 March and killed over 98 people, with hundreds more missing;
 - (b) On behalf of the Iranian Space Agency, a UN-SPIDER regional support office. Heavy rainfall caused widespread flooding in the southwestern provinces of Golestan and Mazandaran that killed at least 45 people and injured many others, with flash floods and mudflows damaging thousands of buildings;
 - (c) On behalf of the National Disaster Management Centre of South Africa, owing to floods and mudslides in Durban and KwaZulu-Natal Province in South Africa, which killed more than 60 people and displaced more than 1,000;
 - (d) On behalf of the Department of Civil Protection of Cameroon, following heavy rains in the far north of the country that caused the Logone River to overflow and inundate Zina, Maga and Kai-Kai districts, affecting 19,359 people in Zina district and 16,215 people in Kai-Kai district.
75. UN-SPIDER also provided space-based information and support to several Member States and organizations that requested assistance following disasters:
- (a) To Namibia in addressing the severe drought that struck the country in early 2019. UN-SPIDER and the Center for Remote Sensing of Land Surfaces generated a time series of maps based on the standard vegetation index in order to compare droughts between 2001 and 2018;
 - (b) To the World Food Programme, through its United Nations Humanitarian Response Depot, in planning emergency assistance in the Bahamas in the aftermath

of Hurricane Dorian. At the request of UN-SPIDER, Maxar technologies collected high-resolution satellite images that were made available through their open data programme, and provided a damage assessment made by crowd assessors;

(c) To the Space and Upper Atmosphere Research Commission of Pakistan in obtaining high-resolution synthetic aperture radar data to assess the damage caused by an earthquake in the eastern part of the country. At the request of UN-SPIDER, Airbus Defence and Space donated to the Commission satellite data from the SPOT, Pleiades, TerraSAR-X and TanDEM-X satellites;

(d) To the Department of Civil Protection of Cameroon and the field office of the Office for the Coordination of Humanitarian Affairs in their response to the floods in the far north of the country.

(a) Raising awareness of the International Charter on Space and Major Disasters

76. Cooperation between the International Charter and the Office for Outer Space Affairs was highlighted and detailed in statements and presentations at several international events and conferences during the reporting period. Every opportunity was taken by the Office to raise awareness of the opportunities offered by the International Charter, in particular, its universal access initiative.

77. UN-SPIDER has been working with relevant institutions in Cameroon, Costa Rica, South Africa, Viet Nam and Zimbabwe to support them in becoming authorized users of the International Charter.

(b) Raising awareness of the Copernicus Emergency Mapping Service

78. In addition to raising awareness of the Charter, the Copernicus Emergency Mapping Service was also highlighted and detailed in statements and presentations at international events and missions during the reporting period. Every opportunity was taken by the Office to raise awareness of the emergency mechanism, including during the Bonn International Conference in November 2019.

(c) Other emergency support activities

79. To complement the efforts of the emergency response community, the Office for Outer Space Affairs contributed to the International Working Group on Satellite-based Emergency Mapping, a voluntary group of organizations involved in satellite-based emergency mapping. The meeting of the International Working Group was hosted during the Bonn International Conference in November 2019.

III. Voluntary contributions

80. In its resolution [74/82](#), the General Assembly encouraged Members States, on a voluntary basis, to provide UN-SPIDER with the additional resources necessary to address the increasing demand for support successfully and in a timely manner. Since its establishment, the programme has benefited from voluntary contributions (cash and in-kind) from the following Governments: Austria, China, Croatia, Czechia, Germany, Indonesia, Republic of Korea, Spain, Switzerland and Turkey.

81. The successful implementation of activities in 2019 benefited from the support and voluntary contributions received from the following Governments and entities:

(a) The Government of China contributed 1,250,000 yuan to support the activities of the UN-SPIDER office in Beijing and the services of two experts from the National Disaster Reduction Centre of China and the China National Space Administration on a non-reimbursable loan basis;

(b) The University of Bonn in Germany contributed 101,474 euros towards the conduct of activities by the UN-SPIDER office in Bonn between June 2019 and June 2020. In June 2019, a five-year cooperation agreement was signed between the University of Bonn and the UN-SPIDER office in Bonn, funded by the German

Aerospace Centre. Within the scope of this cooperation agreement, UN-SPIDER will plan and implement international conferences and expert meetings, undertake knowledge management efforts and provide technical advisory support to Member States, with a focus on Africa;

(c) The Government of Germany contributed the services of an associate expert on a non-reimbursable loan basis;

(d) The Government of Mexico, through the Autonomous University of the State of Mexico and the National Science and Technology Council of Mexico, supported the stay of a visiting scientist in the Bonn office;

(e) The China National Space Administration, the Asia-Pacific Space Cooperation Organization and the Regional Centre for Space Science and Technology Education in Asia and the Pacific contributed to the annual conference organized by UN-SPIDER in Beijing;

(f) The German Aerospace Centre and the Center for Remote Sensing of Land Surfaces contributed to the annual international conference organized by UN-SPIDER and the University of Bonn in Germany;

(g) The Space and Upper Atmosphere Research Commission of Pakistan provided two recommended practices; one for flood mapping and another one for flood hazard assessment;

(h) The Agustin Codazzi Geographic Institute of Colombia provided an updated recommended practice to assess the severity of forest fires;

(i) GeoSAR México donated SPOT satellite imagery to create an updated version of a digital elevation model of the cone of Fuego volcano in Guatemala;

(j) Airbus Defense and Space provided a recommended practice and high-resolution radar satellite imagery for the rapid mapping efforts made by the Space and Upper Atmosphere Research Commission of Pakistan following an earthquake in Pakistan in September 2019;

(k) The Agustin Codazzi Geographic Institute of Colombia provided an updated recommended practice that has already been uploaded to the UN-SPIDER knowledge portal;

(l) The National Disaster Reduction Centre contributed to the Beijing training programme.

82. In-kind contributions made by members of the network of regional support offices have been acknowledged above in this report. The programme is aimed at increasing those inputs as the demand for support from Member States increases significantly. The in-kind and in some cases financial contributions of those organizations are recognized as key to the success of the programme in 2019 and demonstrate the value of UN-SPIDER in building partnerships to improve the capabilities of national and regional institutions with a role in disaster risk reduction and emergency response in developing countries.

IV. Conclusions

83. UN-SPIDER is systematically working to achieve its mission by being a gateway to space information for disaster management, by serving as a bridge between the disaster management, risk management and space communities and by being a facilitator of capacity-building and institutional strengthening, particularly for developing countries.

84. As a result of its awareness-raising activities in 2019, notably through the UN-SPIDER knowledge portal, States Members of the United Nations, especially developing countries, are now more aware of how space-based information can

support disaster management efforts as well as of the efforts of UN-SPIDER worldwide.

85. The UN-SPIDER network and outreach work, through international expert meetings and other formats, has strengthened the links between the space and disaster management communities so as to ensure that space technologies reach end users, especially in developing countries, and that user requirements reach space agencies and feed into their research and development activities. Through memorandums of understanding with private sector entities, the Office for Outer Space Affairs has mobilized new actors with the objective of facilitating access to further data sets, tools and information products for Member States.

86. Through its capacity-building efforts, UN-SPIDER has continued to support a number of countries in developing their technical skills and institutionalizing the use of space-based information in disaster management and emergency response. Member States and their civil protection agencies are now better equipped to use relevant data and tools in order to develop information products, such as flood hazards and drought maps, to support decision-making with regard to disaster management.
