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Committee on the Peaceful Uses of Outer Space

Report on activities carried out in 2020 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 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 25 regional support offices[1] of UN-SPIDER are hosted by national and regional organizations. The regional support offices provide regional coverage of UN-SPIDER activities from institutions specialized in Earth observation, disaster risk reduction and emergency response.

5. The regional support offices contribute to UN-SPIDER international conferences, capacity-building programmes and technical advisory and institutional strengthening missions. They also provide content to the UN-SPIDER knowledge portal.

[1] In 2020, two new regional support offices were added to the network. Further information is available at www.un-spider.org/network/regional-support-offices.

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6. The present report contains a summary of activities carried out under the UN-SPIDER programme in 2020.

II. Activities carried out in 2020

7. The work carried out by UN-SPIDER in 2020 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. Most activities were carried out in a virtual format owing to the coronavirus disease (COVID-19) pandemic.

8. A virtual meeting of the UN-SPIDER regional support offices was conducted on 4 and 5 November 2020. The meeting served as an opportunity to introduce the two new regional support offices, to provide updates on ongoing and upcoming activities and to discuss thematic issues.

9. As part of its technical advisory support activities (see sect. A below), UN-SPIDER conducted one technical advisory mission to Tunisia and provided virtual support to several countries in Africa, Asia, Latin America and the Caribbean. The programme also provided short-term consultants to carry out activities at the national level in Mongolia and Sri Lanka.

10. The outreach activities conducted by UN-SPIDER (see sect. B below) included virtual workshops, conferences, webinars, training courses and side events, and UN-SPIDER contributed to various outreach activities conducted by partners.

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 12 countries.

12. The programme supported the activation of the Copernicus Emergency Mapping Service and the Copernicus Risk and Recovery Service following floods triggered by Hurricanes Eta and Iota in Central America. In addition, UN-SPIDER generated tailor-made space-based information for national disaster management agencies in countries that experienced floods (Guatemala, Honduras, Niger and Nigeria), droughts (El Salvador, Gambia and Mozambique), forest fires (Guatemala, Honduras, Niger and Tunisia) and landslides (Mexico) (see sect. D below).

A. Technical advisory support

13. The activities carried out in 2020 included one technical advisory mission to and training (in person) in Tunisia, and virtual technical advisory and training sessions with Colombia, El Salvador, Guatemala, Honduras, the Lao People’s Democratic Republic, Mongolia, Mozambique, the Niger, Nigeria and Sri Lanka.

Technical advisory mission to Tunisia, 4–6 March 2020

14. At the request of, and in coordination with, the National Civil Protection Office of Tunisia, UN-SPIDER carried out a technical advisory mission to Tunisia from 4 to 6 March 2020 in order to identify the needs of the country regarding and help it to take full advantage of space-based information for disaster management. The mission was carried out with the support of experts from the Algerian Space Agency, the Romanian Space Agency, the National Observatory of Athens and the Copernicus Emergency Management Service.

15. The mission visited six government agencies, including the National Civil Protection Office, and universities, and met with the United Nations country team, which supports national disaster management efforts. The mission took note of the use by these institutions of geographical information systems and of their efforts to

use satellite imagery to analyse natural hazards in the country. The mission also noted that the National Civil Protection Office was an authorized user of the International Charter on Space and Major Disasters and that the country had requested the activation of the Copernicus Emergency Mapping Service for floods in 2018.

16. The mission included a workshop with more than 20 participants from nine institutions. At the workshop, Tunisian counterparts involved in disaster management were given a presentation on the UN-SPIDER programme and encouraged to engage in inter-institutional cooperation and sharing of geospatial information.

Virtual technical advisory support to Nepal, June 2020

17. A briefing session was held with the newly established National Disaster Risk Reduction and Management Authority. The discussion between the Authority and the Resident Coordinator's Office enhanced cooperation in Nepal and paved the way for the provision of increased support to the country in 2021.

Virtual technical advisory support to the Lao People's Democratic Republic, October 2020

18. The UN-SPIDER mission was scheduled to take place in Savannakhet Province from 11 to 15 May 2020. The purpose of the mission was to offer technical advisory support with a view to improving disaster risk management, early warning systems, emergency response and institutional capacity. However, owing to the COVID-19 pandemic, the mission has been postponed and a virtual format through which to deliver the mission's objectives is being sought.

19. A high-level technical advisory meeting was conducted on 19 October 2020 and was attended by the Member of Parliament and Vice-President of the Economic, Technology and Environment Committee of National Assembly, the Vice-Governor of Savannakhet Province and other senior officials. Representatives of two UN-SPIDER regional support offices, the International Water Management Institute and the Asian Disaster Preparedness Centre also attended the meeting.

20. As a follow up, a joint project proposal between UN-SPIDER regional support offices and the Lao People's Democratic Republic will be prepared for flood and drought monitoring, early warning for disaster preparedness and the building of resilience among smallholder farmers.

Virtual support to Honduras, July to December 2020

21. UN-SPIDER held six webinars and discussion sessions with staff at the Forest Conservation Institute of the Ministry of Environment and staff at the national office of the Food and Agriculture Organization of the United Nations in order to raise awareness of novel satellite technologies and products for monitoring forest fires. Participants took note of the UN-SPIDER recommended practice on burn severity mapping, the capacity of the Sentinel-5P satellite to monitor smoke dispersion in the atmosphere and a procedure developed in Colombia for assessing the susceptibility of vegetation to forest fires.

22. As a follow-up, UN-SPIDER will provide technical advisory support to the Forest Conservation Institute through the creation of a 20-year database of forest fires (2000–2020), the modelling of the susceptibility of vegetation to forest fires in two geographical areas identified by the Institute and dedicated training on the use of these novel applications.

Virtual support to Mozambique, August to December 2020

23. UN-SPIDER and the Federal University of Santa Maria of Brazil (a UN-SPIDER regional support office) conducted three webinars for staff at the National Institute for Disaster Management, the National Meteorological Institute, the Regional Water Administration Authorities, the Ministry of Public Works, Housing and Water Resources, the Mozambique Red Cross and universities in order

to raise awareness of the applications of novel satellite technologies and products to monitor droughts and map the geographical extent of floods. The National Institute for Disaster Management, the Regional Water Administration Authorities and the Ministry of Public Works, Housing and Water Resources gave presentations on their efforts to monitor floods and droughts; the development of an information system on arid and semi-arid areas; the use of the Africa risk capacity tool by the National Institute for Disaster Management; and efforts by the Ministry of Public Works, Housing and Water Resources to monitor droughts.

24. UN-SPIDER, together with the National Institute for Disaster Management, the National Meteorological Institute and other institutions, including universities, discussed the establishment of a technical, inter-institutional team that would focus on the generation of geospatial information to support disaster management using geographical information systems and Earth observation applications.

Virtual support to Colombia, August to November 2020

25. UN-SPIDER and the Agustin Codazzi Geographic Institute of Colombia (a UN-SPIDER regional support office) conducted two webinars for staff at the National Disaster Risk Management Unit and the Geological Survey of Colombia. UN-SPIDER visiting scientists presented the results of and challenges involved in the development of a methodology to map landslides triggered by earthquakes. The webinars also provided an opportunity to discuss the standard operating procedures for the activation of the International Charter on Space and Major Disasters.

26. In addition, UN-SPIDER was invited to participate in the eighth meeting of chiefs of the information technology offices of institutions linked to the agricultural sector, which was organized by the Ministry of Agriculture and Rural Development of Colombia. A UN-SPIDER visiting scientist delivered a presentation on the use of Earth observation technologies in the agricultural sector, with a focus on droughts and forest fires.

Virtual support to Guatemala and Honduras following forest fires in May 2020

27. In order to raise awareness of the new products available for the monitoring of forest fires and the UN-SPIDER recommended practice on burn severity mapping, a visiting scientist created maps of the burn severity of forest fires in Peten Province, Guatemala, and the central region of Honduras in May 2020.

Virtual support to El Salvador in December 2020

28. At the request of the National Civil Protection Directorate of the Ministry of the Interior, UN-SPIDER participated in four workshops organized by the Directorate for its staff in four provincial offices. UN-SPIDER facilitated the virtual participation of experts from several regional support offices and national disaster management agencies of Latin American countries.

Virtual support to the Niger and Nigeria, September and October 2020

29. At the request of the National Emergency Management Agency and the National Space Research and Development Agency of Nigeria, UN-SPIDER conducted three webinars to present UN-SPIDER resources and showcase how space technologies could support flood and drought monitoring efforts. During the virtual meetings, the two agencies discussed their use of geospatial data and geographical information systems in disaster management.

30. UN-SPIDER also conducted an online meeting with the General Directorate for Civil Protection of the Niger to provide an overview of the UN-SPIDER programme and its technical advisory support activities, in particular, with a view to engaging in joint activities in the future.

Technical advisory support to Mongolia, July to December 2020

31. As a result of the COVID-19 pandemic, a technical advisory support mission to Mongolia scheduled for July to December 2020 could not go ahead. Instead, UN-SPIDER offered the National Emergency Management Agency of Mongolia the services of a national consultant for five months in order to facilitate the use of space-based information in disaster management.

32. During this period, three capacity-building programmes were carried out with officials from various stakeholder agencies and provincial offices of the National Emergency Management Agency. The national consultant supported the strengthening of the Platform for Real-time Impact and Situation Monitoring, which was developed by the World Food Programme and the National Emergency Management Agency. The consultant also assisted the National Emergency Management Agency in becoming an authorized user of the International Charter on Space and Major Disasters.

33. With a view to the provision of continued support in 2021, the National Emergency Management Agency and UN-SPIDER submitted a project proposal on a web-based integrated national disaster information system to the Resident Coordinator's Office.

Technical advisory support to Sri Lanka, from November 2020

34. In 2019, UN-SPIDER and the Disaster Management Centre of Sri Lanka developed a geospatial dashboard that identifies indicators of the Sendai Framework for Disaster Risk Reduction 2015–2030 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.

35. In 2020, UN-SPIDER offered the Centre the services of a national consultant for five months. The consultant has been working with the Centre and the International Water Management Institute, a regional support office based in Sri Lanka. This collaboration is expected to lead to the creation of data content in the geospatial dashboard and facilitate the monitoring of Sendai Framework targets.

Training on flood mapping with radar data in Tunisia, 9–11 March 2020

36. To support the National Civil Protection Office of Tunisia and other government agencies in using space-based information for disaster management, UN-SPIDER conducted a training course in Tunis from 9 to 11 March. The training course highlighted the relevance and usefulness of remote sensing and satellite data as a decision-making tool in risk and disaster management. The 12 course participants were introduced to the basic principles of synthetic aperture radar and applied the recommended practice for flood mapping with Sentinel-1 radar data using the Sentinel Application Platform of the European Space Agency.

Virtual training on flood mapping with radar data for Nigeria, 21–23 September 2020

37. In order to strengthen the capacity of the National Emergency Management Agency of Nigeria to use space-based information to respond to floods in the country, UN-SPIDER conducted an online training course on flood mapping with Sentinel-1 radar imagery in Google Earth Engine. The three two-hour sessions were attended by staff at the National Emergency Management Agency and the National Space Research and Development Agency.

Virtual training on flood mapping with radar data for the Niger, 26 and 27 November 2020

38. In order to strengthen the capacity of the General Directorate for Civil Protection of the Niger to use space-based information to respond to floods in the country, UN-SPIDER conducted an online training course on flood mapping with

Sentinel-1 radar imagery in Google Earth Engine. During the training, participants were introduced to the basic principles of radar remote sensing, learned to use the recommended practice, explored the process with selected case studies and presented the results in geographical information systems as flood maps.

B. Outreach and networking activities

39. 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

Regional training for the arid region of Western Asia, Istanbul, Turkey, 18–20 February 2020

40. An international capacity-building programme on combating disasters in arid regions using space-based and geospatial technologies in Turkey was offered to promote the use of space-based information in disaster management in Western Asia. The activity benefited from technical and financial contributions from Delta State University, which is a regional support office of UN-SPIDER in the United States of America. A total of 22 participants from 11 countries attended the training.

UN-SPIDER webinar on the theme “Novel satellite products and services for forest fire management”, 10 June 2020

41. With the support of a visiting scientist, UN-SPIDER conducted an international webinar to raise awareness of novel products and services to map the burn severity of forest fires. The webinar addressed the use of products and services using the Sentinel-5P and GOME-2 satellite sensors and state-of-the-art Copernicus operational datasets in applications for forest fire management and monitoring systems, to map forest fires using cloud-based solutions and atmospheric observations of fire emissions. More than 200 participants, from Latin American countries as well as from Germany, India and Spain, took part in the webinar.

UN-SPIDER virtual international expert meeting on the theme “Space-based solutions for risk and disaster management in Africa”, 30 June–2 July 2020

42. UN-SPIDER and the Centre for Remote Sensing of Land Surfaces of the University of Bonn (a UN-SPIDER regional support office) jointly conducted a virtual international expert meeting. The meeting addressed the role of satellite technologies and novel applications developed by the space community in responding to challenges posed by natural hazards in Africa. It brought together nearly 60 participants from disaster management agencies, space agencies, other government agencies and universities of eight African countries, several United Nations entities, experts from a number of UN-SPIDER regional support offices and the Africa Regional Centre for Space Science and Technology Education – in English Language, and experts from institutions in other countries.

43. The virtual expert meeting comprised three sessions held over three days on the topics “Space technologies for early warning: opportunities and lessons learned”, “Integrating dynamic data sources in decision support systems for disaster” and “The way forward: harnessing the power of integrated dynamic data sources”. In addition, a training session was delivered by the Joint Research Centre of the European Commission on the use of the Global Flood Awareness System, a web-based application that provides daily flood forecasts.

UN-SPIDER virtual regional expert meeting for Latin America and the Caribbean on the theme “Space-based solutions for disaster risk reduction and emergency response in Latin America”, 22–24 September 2020

44. UN-SPIDER and four regional support offices (Argentina, Brazil, Colombia and Mexico) co-organized a virtual regional expert meeting to address the role of satellite technologies and novel applications developed by the space community in responding to challenges posed by natural hazards in Latin America and the Caribbean. The meeting was attended by nearly 200 people from approximately 70 disaster management agencies, space agencies, other government agencies and universities in 15 countries, various United Nations entities, experts from the Regional Centre for Space Science and Technology Education for Latin America and the Caribbean, and experts from regional institutions, including the Central American Integration System and the Coordination Centre for the Prevention of Natural Disasters in Central America.

45. Presentations were delivered by representatives of the UN-SPIDER regional support offices, national disaster management agencies, space agencies and regional organizations, and discussion sessions were held.

46. Participants agreed on the need to continue taking note of advances made by Latin American institutions in the use of space technologies and in the establishment of a regional technical group of professionals to contribute to disaster response efforts.

Annual meeting with regional support offices, 4 and 5 November 2020

47. A virtual meeting of the UN-SPIDER regional support offices was attended by 18 regional support offices. Two new regional support offices were introduced, and updates were given on ongoing and upcoming activities. A number of thematic issues were discussed, including the engagement of end users, gender inclusivity and the potential for cooperation between regional support offices.

United Nations International Conference on Space-based Technologies for Disaster Risk Reduction on the theme “Lessons learned during the unprecedented pandemic situation”, virtual event, 24 and 25 November 2020

48. In view of the measures put in place to curb the COVID-19 pandemic, disaster management agencies require precise information on hazards and risks and early warning of upcoming disasters in order to keep communities safe and plan effective emergency responses.

49. The theme of the United Nations International Conference on Space-based Technologies for Disaster Risk Reduction was “Lessons learned during the unprecedented pandemic situation”; the conference explored those lessons through the use of space-based tools and geospatial information.

50. The two-day conference was co-organized by UN-SPIDER with the support of the United Nations Office for Disaster Risk Reduction and was attended by 204 people from 50 countries, representing over 110 organizations.

Massive open online course on geospatial applications for disaster risk management

51. A massive open online course on geospatial applications for disaster risk management was developed by UN-SPIDER and the Centre for Space Science and Technology Education for Asia and the Pacific. It was a free, self-paced online training programme available to all those wishing to enhance their capabilities in the use of geospatial and Earth observation technologies in disaster risk management.

52. A total of 18 experts from 12 organizations contributed to 20 sessions. The course was launched on 13 October 2020 – the International Day for Disaster Risk

Reduction – and remained open until 30 November. More than 34,000 participants from approximately 140 countries enrolled in the course.

2. Organization of or contributions to other initiatives, events and webinars

53. UN-Spider made the following contributions to events organized on the initiative of various partner organizations:

(a) Contribution to the Blueprint strategy review of the Committee of Experts on Global Geospatial Information Management;

(b) Contribution to the geospatial strategy of the United Nations Geospatial Network, coordinated by the Office of Information and Communications Technology;

(c) Space4Health webinar, organized by the Office for Outer Space Affairs, 14 May 2020;

(d) Webinar on disaster and world heritage with a focus on pandemics, organized by the United Nations Educational, Scientific and Cultural Organization (UNESCO) Category II Centre for Asia and the Pacific, 22 May 2020;

(e) Webinar on space-based inputs for locust early warning and preparedness, organized by the Office for Outer Space Affairs, 12 June 2020;

(f) Webinar on advancing humanitarian responses through space technology, organized by the World Humanitarian Forum, 2 July 2020;

(g) Earth observation – critical information ahead of crises, organized by the Special Centre for Disaster Research of Jawaharlal Nehru University, India, 5 July 2020;

(h) Third training of trainers on Sendai Framework monitoring and disaster loss accounting, organized by the United Nations Office for Disaster Risk Reduction, 29 October 2020;

(i) United Nations/Austria symposium on the theme “Space applications for Sustainable Development Goal 13: Climate Action”, 2 September 2020;

(j) World Space Forum, organized by the Office for Outer Space Affairs, 7 October 2020;

(k) Workshop on space for intelligent health, organized by the European Space Agency, 3 November 2020;

(l) Office for Outer Space Affairs space law conference on the theme “Emerging issues in space law and policy – perspectives for African nations”, 9 December 2020.

C. Knowledge management

54. 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.

1. Knowledge portal

55. 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. The number of visitors to the portal has continually increased since it was launched. In 2020, the average number of monthly visits to the knowledge portal

increased by over 30 per cent, from 30,000 to approximately 40,000. By the end of 2020, the number of content items had increased to more than 9,100. The sections with the highest addition rates include the news, events, data sources and institutions sections.

56. 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. The Space and Upper Atmosphere Research Commission of Pakistan, which is a UN-SPIDER regional support office, provided a recommended practice for “drought hazard monitoring and assessment”.

57. The programme developed a recommended practice on the use of Sentinel-1 radar imagery to assess the extent of floods using the cloud-based Google Earth Engine tool, a recommended practice on the detection of earthquake damage to urban areas using Sentinel-1 radar imagery, and a recommended practice relating to the integration of remote sensing data on recurring floods, infrastructure and socioeconomic circumstances using free and open-source software to support prevention and preparedness efforts.

58. An additional version of the recommended practice on monitoring drought using vegetation indexes was developed to facilitate its use with cloud-based solutions.

59. UN-SPIDER published three background information pages on how to use space-based technologies to address specific hazards and related technical questions, entitled “data applications of the month”, were published in both English and Spanish. They covered the topics of river flooding, space data infrastructure and geospatial data management, and machine learning for flood detection.

60. UN-SPIDER also published background information pages on the topics “early warning systems” and “the United Nations and early warning”, alongside pages dedicated to the International Asteroid Warning Network and the International Space Weather Initiative. In addition, several “user stories” were published with the assistance of UN-SPIDER partners, on topics such as landslide susceptibility, flood modelling and the monitoring of volcanic activities.

61. Efforts were made to incorporate additional content in the Spanish and French versions of the UN-SPIDER knowledge portal. As a result, the number of visits to the Spanish version increased substantially compared with previous years.

62. In order 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 further improved by linking content that covers the same natural hazards, space technologies and UN-SPIDER activities.

63. UN-SPIDER has also improved the links on the knowledge portal to the activities of the regional support offices and the hazards they address.

2. Use of cloud-based solutions

64. Given the limited information technology resources of civil protection agencies, as observed during technical advisory support activities, UN-SPIDER increased the use of cloud-based geographical information system solutions. Examples include the use of online systems such as Google Earth Engine in recommended practices and the promotion of web-based systems during technical advisory support and outreach activities.

65. UN-SPIDER makes regular use of the Copernicus Data and Exploitation Platform developed by the German Aerospace Centre. The platform offers access to remote sensing data and cloud computing resources, which UN-SPIDER has been using to process remote sensing data in order to support Member States during emergencies.

D. Support to emergencies

66. 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 Department of Disaster Management of Myanmar for a landslide at a jade mine on 2 July that killed more than 180 people;

(b) On behalf of the Ministry of Agriculture and Natural Resources of the Sudan on 8 August 2020 following extreme and unprecedented floods that killed more than 150 people and affected more than 875,000;

(c) On behalf of the National Civil Protection Directorate of the Niger. Heavy rainfall caused widespread flooding along the Niger River, killing at least 45 people and displacing more than 225,000 in various areas, including Niamey, Tenda, Diffa, Baleyara, Tahoua, Bangi and Dogondoutchi;

(d) On behalf of the Federal Civil Protection System and the Mexican Space Agency owing to extremely large floods in the Tabasco region. The flooding began at the end of October and continued until the end of November 2020.

67. UN-SPIDER also provided space-based information and support to several Member States and organizations that requested assistance following disasters:

(a) To the National Civil Protection Office of Tunisia in addressing fires in the country between May and August. UN-SPIDER created a map indicating active fire hotspots and burned areas;

(b) To the National Emergency Management Agency of Nigeria owing to floods in September 2020. UN-SPIDER mapped flooding along the Niger River in Nigeria through the UN-SPIDER recommended practice on flood mapping and damage assessments using Sentinel-1 radar imagery in Google Earth Engine;

(c) To the General Directorate for Civil Protection of the Niger in responding to floods and wildfires in the country in October and November 2020. UN-SPIDER mapped floods along the Niger river using Sentinel-1 radar data and created a map indicating active fire hotspots to assess the burn severity of affected vegetation using Sentinel-2 satellite imagery in Google Earth Engine;

(d) UN-SPIDER and its visiting scientists created a number of maps of rural areas in the State of Oaxaca that were hit by landslides triggered by an earthquake on 23 June 2020. Radar interferometry procedures were employed with Sentinel-1 satellite radar images and change detection techniques were used with Sentinel-2 optical imagery. Airbus Defence and Space donated high-resolution TerraSAR X radar imagery for this assessment. The results were presented to the Mexican Space Agency, the National Centre for Disaster Prevention and the Federal Civil Protection System of Mexico.

68. In November 2020, two powerful hurricanes, Eta and Iota, struck Central America. The hurricanes triggered floods in the lower basins of many rivers, including the Aguán, Choluteca, Patuca and Ulúa in Honduras. In the case of Guatemala, floods were triggered along the Pasión, Motagua, Polochic and Usumacinta rivers. UN-SPIDER supported disaster response efforts in Honduras and Guatemala as follows:

(a) At the request of the Permanent Contingency Commission of Honduras, the National Coordinating Agency for Disaster Reduction of Guatemala and the Coordination Centre for the Prevention of Natural Disasters in Central America, UN-SPIDER created a number of maps of areas in Honduras and Guatemala that were affected by floods;

(b) The maps were also shared with staff at the Economic Commission for Latin America and the Caribbean and the national offices of the United Nations Office for the Coordination of Humanitarian Affairs in Honduras and Guatemala. The Economic Commission for Latin America and the Caribbean was tasked with carrying

out a damage assessment of the impacts in Honduras and Guatemala and benefited from the maps produced by UN-SPIDER.

Raising awareness of the International Charter on Space and Major Disasters

69. 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.

70. UN-SPIDER has been working with relevant institutions in Cameroon, Costa Rica, Ethiopia, the Gambia, Mozambique, the Niger, Panama, Zimbabwe and the Cayman Islands to support them in becoming authorized users of the International Charter.

Raising awareness of the Copernicus Emergency Mapping Service

71. 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, including at the UN-SPIDER virtual international expert meeting on the theme “Space-based solutions for risk and disaster management in Africa”, held from 30 June to 2 July 2020.

72. Furthermore, the Copernicus Emergency Mapping Service and the Copernicus Risk and Recovery Service were activated at the request of the Permanent Contingency Commission of Honduras and the Coordination Centre for the Prevention of Natural Disasters in Central America following Hurricanes Eta and Iota in November 2020.

III. Voluntary contributions

73. 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, Mexico, Republic of Korea, Spain, Switzerland and Turkey.

74. The successful implementation of activities in 2020 benefited from the support and voluntary contributions received from the following Governments and entities:

(a) The Government of China contributed 1,100,000 yuan to support the activities of the UN-SPIDER office in Beijing and the services of one expert from the National Disaster Reduction Centre of China;

(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 2020 and June 2021. Within the scope of the cooperation agreement between the University of Bonn and the UN-SPIDER office in Bonn, 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, extended the stay of a visiting scientist in the Bonn office;

(e) The UN-SPIDER programme benefited from the support provided by a visiting scientist from Colombia;

(f) The Space and Upper Atmosphere Research Commission of Pakistan provided one recommended practice for drought monitoring;

(g) Airbus Defence and Space provided high-resolution radar satellite imagery for the rapid mapping efforts made by visiting scientists following an earthquake in Mexico in June 2020. In addition, it provided timely and relevant information extracted using its high-resolution digital elevation model on potential flooding along the Eastern coast of Nicaragua owing to Hurricane Eta.

75. In-kind contributions made by members of the network of regional support offices have been acknowledged above in this report. Memorandums of understanding were renewed with five regional support offices. Two new organizations became regional support offices: the Federal University of Santa Maria in Brazil and the Ben-Gurion University of the Negev in Israel.

76. Amid the COVID-19 pandemic, several organizations and partners contributed to virtual events organized by UN-SPIDER.

IV. Conclusions

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

78. In 2020, because of the global pandemic, UN-SPIDER carried out most of its activities in a virtual format, delivering technical advisory support, institutional strengthening and capacity-building programmes. New initiatives such as webinars, virtual conferences and a massive open online course attracted a large number of participants, revealing the power of virtual technologies.

79. Owing to the travel restrictions imposed as a result of COVID-19, UN-SPIDER provided long-term support to disaster management agencies in the form of national experts, in place of the short-term institutional strengthening missions carried out in previous years.