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Committee on the Peaceful Uses of Outer Space
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Addendum

VI. Space-system-based disaster management support

1. In accordance with General Assembly resolution 77/121, the Subcommittee considered agenda item 8, entitled "Space-system-based disaster management support".

2. The representatives of Algeria, Argentina, Austria, Canada, China, France, Germany, India, Indonesia, Iran (Islamic Republic of), Japan, Mexico, Nigeria, Pakistan, Paraguay, the Republic of Korea, the Russian Federation, the United Kingdom, the United States and Venezuela (Bolivarian Republic of) made statements under agenda item 8. During the general exchange of views, statements relating to the item were also made by representatives of other member States.

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

(a) "Earth observation for responsive disaster management", by the representative of the Republic of Korea;

(b) "Space data usage and applications for disaster risk reduction and management in the Philippines", by the representative of the Philippines;

(c) "APSCO data sharing for regional sustainability and member States emergency response", by the observer for the Asia-Pacific Space Cooperation Organization (APSCO);

(d) "Supplementing Earth observation with social media data for disaster risk management", by the observer for the Space Generation Advisory Council.

4. The Subcommittee had before it the report on activities carried out in 2022 in the framework of the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER) (A/AC.105/1270).

5. The Subcommittee welcomed with appreciation the achievements of and the activities carried out by UN-SPIDER in 2022 and noted that space-based support for disaster risk reduction and emergency response was vital for addressing and mitigating the impact of natural disasters.

6. The Subcommittee noted that, with the continued support of its network of partners, including the regional support offices, UN-SPIDER had carried out the following activities during 2022:

(a) Technical advisory mission to Armenia, from 27 June to 1 July;

(b) Technical advisory mission to the Philippines, from 26 to 30 September;

(c) Technical advisory mission to Paraguay, from 21 to 25 November;

(d) Institutional strengthening mission to Ghana, from 9 to 12 May;

(e) Institutional strengthening mission to Nigeria, from 12 to 16 September;

(f) Virtual support to the Dominican Republic, on 26 and 27 July;

(g) Technical advisory support to Sri Lanka, in January;

(h) Technical advisory support to Mongolia, in January and February and from September to December.

7. As part of those activities, specific requirements had been addressed and follow-up support had been provided to countries in which UN-SPIDER technical advisory missions had been carried out in previous years.

8. The Subcommittee noted with satisfaction that UN-SPIDER had delivered tailored space-based information and resources that had helped to strengthen the capacity of States to effectively respond to disasters triggered by natural hazards.

9. The Subcommittee noted the continued outreach activities, including webinars and virtual expert meetings, carried out by the Office for Outer Space Affairs through UN-SPIDER, and the Office's partnerships with United Nations entities, international organizations and Member States aimed at continuing to promote the use of space-based tools and information to support disaster management and disaster risk reduction.

10. Some delegations expressed the view that, while they had developed their own disaster management and emergency response procedures that utilized the expertise and resources of their national actors and space agencies to provide early warning and response services, national responses were facilitated and strengthened by the provision of space-based imagery and data sourced both through their own space activities and through ongoing cooperation mechanisms such as the Charter on Cooperation to Achieve the Coordinated Use of Space Facilities in the Event of Natural or Technological Disasters (International Charter on Space and Major Disasters), the Copernicus Emergency Management Service, the Sentinel Asia project and UN-SPIDER. The delegations expressing that view also expressed the view that such cooperation was particularly relevant and important in providing rapid access to satellite imagery and derived information during devastating disasters affecting large areas, such as the recent earthquake that had severely affected the Syrian Arab Republic and Türkiye.

11. Some delegations expressed the view that disasters triggered by natural hazards, especially those connected to hydrometeorological events and forest fires, had become more frequent and severe and had resulted in increased loss of life, property damage and economic disruption in 2022, and that national authorities would increasingly need access to satellite imagery and data services in order to continue to provide essential services to affected populations. The delegations expressing that view also expressed the view that a multilateral approach and international collaboration were crucial for responding to those challenges, which were seen as resulting from continued climate change.

12. Some delegations expressed the view that it was important to contribute to international coordination mechanisms to support disaster recovery, noting that the provision of Earth observation imagery and data and the activities of the network of regional support offices of UN-SPIDER, were useful examples of such cooperative efforts.

13. The view was expressed that, through the Recovery Observatory, a pilot project of the Committee on Earth Observation Satellites, satellite imagery acquisition and the subsequent analysis of such imagery were being coordinated with the aim of contributing to reconstruction and recovery efforts.

14. The Subcommittee noted the financial and staff resources that had been contributed by China, France and Germany to UN-SPIDER and the in-kind contributions, including the provision of experts, made by some States members of the Committee and by the regional support offices in 2022 in support of the activities conducted by the Office for Outer Space Affairs through UN-SPIDER, as well as their efforts to share experiences with other interested countries.

VII. Recent developments in global navigation satellite systems

15. In accordance with General Assembly resolution 77/121, the Subcommittee considered agenda item 9, entitled "Recent developments in global navigation satellite systems", and reviewed matters related to the International Committee on Global Navigation Satellite Systems (ICG), the latest developments in the field of global navigation satellite systems (GNSS) and new GNSS applications.

16. The representatives of Algeria, China, India, Indonesia, Italy, Japan, Pakistan, the Republic of Korea, the Russian Federation, the United Arab Emirates and the United States made statements under agenda item 9. During the general exchange of views, statements relating to the item were made by representatives of other member States.

17. The Subcommittee heard the following technical presentations:

(a) "BeiDou Navigation Satellite System: featured services and applications", by the representative of China;

(b) "GNSS space service volume and lunar GNSS activities", by the Co-Chair of the space use subgroup of the ICG working group on enhancement of GNSS performance.

18. The Subcommittee had before it the following:

(a) Note by the Secretariat on the sixteenth meeting of the International Committee on Global Navigation Satellite Systems (A/AC.105/1276);

(b) Report of the Secretariat on activities carried out in 2022 in the framework of the workplan of the International Committee on Global Navigation Satellite Systems (A/AC.105/1278);

(c) Report on the United Nations International Meeting on the Applications of Global Navigation Satellite Systems (A/AC.105/1290).

19. The Subcommittee noted that satellite-based navigation was a key enabling technology and innovation driver for the modern economy, and that ICG was an important platform for communication and cooperation in the field of GNSS, especially in the areas of compatibility and interoperability among the different systems and GNSS spectrum protection and interference detection. It also noted that a technical booklet on the importance of GNSS spectrum protection and interference detection and mitigation was currently being developed by the executive secretariat of ICG.

20. The Subcommittee noted with satisfaction that the sixteenth meeting of ICG and the twenty-sixth meeting of the Providers' Forum, organized by the United Arab Emirates Space Agency on behalf of the Government of the United Arab Emirates, had been held in Abu Dhabi from 9 to 14 October 2022. It also noted that an expert seminar on low Earth orbit positioning, navigation and timing had been held in conjunction with the meeting and that the participants in the expert seminar had discussed how positioning, navigation and timing services could be offered through low Earth orbit satellite constellations. The Subcommittee also noted that the

seventeenth meeting of ICG would be organized by the European Union and held in Madrid from 15 to 20 October 2023.

21. The Subcommittee expressed its appreciation to the Office for Outer Space Affairs for serving as the executive secretariat of ICG and its Providers' Forum and expressed its satisfaction with the efforts of the Office in promoting the use of GNSS, particularly in developing countries. The Subcommittee noted that, with education and capacity-building forming the core of the ICG programme on GNSS applications, and pursuant to the ICG workplan, the Office for Outer Space Affairs had organized a series of training courses and technical seminars and had supported follow-up projects in various fields of science and industry, including in the field of ionospheric research using GNSS technologies.

22. The Subcommittee noted that the Global Positioning System (GPS) of the United States remained a reliable pillar throughout the world and that the United States had continued to upgrade the capability of and service provided by GPS through the integration of the newest generation of satellites, GPS Block III, which were broadcasting the third civil signal, L1C. The Subcommittee also noted that the sixth GPS Block III satellite vehicle had been launched on 18 January 2023, bringing the total number of GPS Block III satellites in orbit to six. In addition, new capabilities and enhancements to the GPS Block IIF satellites were being designed. Those satellites would also host, as part of the United Sates contribution to the International Satellite System for Search and Rescue (COSPAS–SARSAT), a laser retroreflector array to enable the precise optical laser ranging of GPS satellites and a search-and-rescue repeater to relay distress signals to rescuers.

23. The Subcommittee further noted that, in 2022, the United States Coast Guard Navigation Center had secured the public release of the antenna patterns for GPS Block III, which would further improve the ability of space mission planners to conduct accurate analyses of the extent to which GPS could support their space missions.

24. The Subcommittee noted that the service provided by the Global Navigation Satellite System (GLONASS) of the Russian Federation operated on the basis of open access navigation signals in the L1 and L2 radio frequency bands. In 2022, three satellites had been launched, two of which were part of the third generation of the GLONASS constellation, namely, the GLONASS-K satellite. Those satellites, which were equipped with on-board radio systems for intersatellite communication and ranging, improved positioning accuracy, thereby providing services to a broader range of users. Additionally, five GLONASS-K services integrated into COSPAS–SARSAT system facilitated the registration of emergency signals and thus improved the efficiency of search and rescue operations.

25. The Subcommittee also noted that 10 GLONASS satellites had been broadcasting the third open access signal in the L3 radio frequency band. Further gradual rejuvenation of the GLONASS constellation would ensure that the high-precision navigation services provided continued to be improved and that a decimetre-level accuracy of real-time positioning could be achieved by the integrated use of GLONASS with other GNSS.

26. The Subcommittee noted that, in 2022, the BeiDou Navigation Satellite System (BDS) constellation of China had been further improved and that its applications had expanded to offer a broader range of higher-quality public services. BeiDou-3, also referred to as the "BeiDou system", had been completed and provided global, all-weather, all-round, high-precision positioning, navigation and timing services. Regarding the BeiDou satellite-based augmentation service platform, the Subcommittee also noted that the Civil Aviation Administration of China had begun the process for the certification of its single-frequency service and that, at the trial operation stage, positioning accuracy, alarm time, integrity risk and other indicators had met the requirements. Meanwhile, in terms of the ground-based augmentation system, real-time centimetre-level and post-event millimetre-level high-precision services had been provided within China for industry and public sector users.

27. The Subcommittee further noted that the BeiDou system had been adopted as the third operator to provide tracking systems for ships after having been given a certificate by the International Maritime Organization. The BeiDou message service system would offer an additional means of communicating shipping distress and safety messages. The Subcommittee noted that the BeiDou system would become increasingly integrated with emerging technologies such as 5G, artificial intelligence and big data, which would enable it to make an even greater contribution to the development of human society.

28. The Subcommittee noted that India was pursuing two paths as part of its satellite navigation programme. The GPS-aided Geostationary Augmented Navigation System (GAGAN), a satellite-based augmentation system, had been established to provide more accurate positioning information for use in civil applications. The Indian Regional Navigation Satellite System, also known as "Navigation with Indian Constellation" (NavIC), had been implemented as an independent regional navigation system, and the NavIC signal-in-space interface control document had been made available to the public to enable the production of user receivers. Currently, more than 35 mobile telephone models released in India had NavIC capability; that number would increase with the introduction of 5G-enabled telephones.

29. The Subcommittee also noted that, in 2022, India had worked on developing the International Electrotechnical Commission standard for NavIC-based shipborne receiver equipment. It further noted that the NavIC-based safety-of-life alert dissemination system had been in operation for fishers to issue alerts about impending disasters. Additionally, an initiative had been launched to issue alerts in respect of terrestrial disasters such as landslides, earthquakes, floods, heavy rains and avalanches through the NavIC system; and appropriate updates to the NavIC message system were being carried out.

30. The Subcommittee noted that the Quasi-Zenith Satellite System (QZSS) of Japan, also known as "Michibiki", had been operating as a four-satellite constellation, of which the QZS-1R satellite had become fully operational in March 2022. QZSS was currently providing three types of services: a service complementing GPS that transmitted ranging signals from satellites; a high-accuracy service that augmented GNSS by providing error corrections through QZSS; and a short messaging service to contribute to disaster risk reduction. The Subcommittee also noted that the QZSS constellation would be expanded to a total of seven satellites in 2024.

31. The Subcommittee further noted that Japan had begun a GNSS augmentation trial service for high-accuracy applications based on a precise point positioning (PPP) technique known as the Multi-GNSS Advanced Demonstration Tool for Orbit and Clock Analysis (MADOCA-PPP) and an early warning service for the Asia and Oceania regions. The two services would start operating in 2024 and 2025, respectively. Japan had also been supporting Multi-GNSS Asia to encourage GNSS service providers and user communities to develop new applications and businesses.

32. The Subcommittee noted that Italy had been involved in the development and operation of the European Satellite Navigation System (Galileo) and was pursuing technical developments for future systems. The Subcommittee also noted that Galileo was currently demonstrating state-of-the-art performance and offering high-accuracy services. In the framework of the European Space Agency and European Union navigation programmes, Italy was participating in the GPS Environmental and Earth Science Information System (GENESIS), which would enhance the accuracy of the Earth space reference system and improve the precise orbit determination of Galileo and other satellites. Italy was also pursuing the extension of satellite navigation technologies to the field of planetary exploration, starting with the Moon.

33. The Subcommittee noted that Algeria, through the Algerian Space Agency, was currently developing a satellite-based augmentation system (AL-SBAS) based on the communication satellite Alcomsat-1, which was located at 24.8 W in a geostationary orbit. The satellite-based augmentation system, which was compatible with the standards of the International Civil Aviation Organization, the Radio Technical

Commission for Aeronautics and the European Organization for Civil Aviation Equipment, was aimed at improving positioning accuracy and integrity in Algeria and the surrounding area.

34. The Subcommittee noted that Pakistan, through the Space and Upper Atmosphere Research Commission (SUPARCO), had promoted the development of a complete ecosystem to provide users with the GNSS infrastructure, as well as the technology and end-to-end solutions support for using the infrastructure. SUPARCO had also been enabling precise positioning through a ground-based augmentation system, utilizing real-time kinematic network technology, to meet the precise positioning requirements of the civil sector. Assistance was also being provided to the civil aviation sector through the implementation of GNSS technology for safe, secure and efficient airport operations.

35. The Subcommittee noted with appreciation that Indonesia had reported on its research projects and activities focused on the application of GNSS technology, including the development of an ionospheric tsunami power index to detect tsunamis and a regional ionospheric total electron content map for the purposes of a GNSS position correction application.