

Report on “Geospatial Capacity Development Conference on GNSS Applications and DRR¹”

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Abstract

The Geospatial Information Authority of Japan (GSI) serves as Co-Chair of Working Group on Geospatial Information and Services for Disasters (WG-Disasters) and lead of Task Group B of WG-Disasters in UN-GGIM, and is a member of the Subcommittee on Geodesy. At UN-GGIM-AP, which is one of its regional committees, the GSI serves as Vice-President, Chair of working group on Geodetic Reference Frame, and Vice-Chair of the working group on Integrating of Geospatial Information and Statistics. Furthermore, in addition to registering two policies in the Japanese government's "SDGs Action Plan", i.e., "Promotion of the Global Geodetic Reference Frame (GGRF)" and "Promotion of partnerships using geospatial information," GSI is also furthering policies related to the Promotion of the GNSS CORS Network introduction overseas in accordance with plans and strategies of the Japanese government, such as the Basic Plan for the Advancement of Utilizing Geospatial Information, the agenda of the Basic Plan for Outer Space, and the 2025 Policy Program for Promotion of Overseas Infrastructure System, etc. .

Based on its position and policies, the GSI held the "Geospatial Capacity Development Conference on GNSS Applications and DRR" from January 17 (Monday) to 20 (Thursday), 2022, via an online conference with the aim of contributing to the SDGs through capacity development that makes use of our expertise in geospatial information in the fields of GNSS utilization and disaster risk reduction. The conference was held jointly by the GSI, UN-GGIM WG-Disasters and UN-GGIM-AP. On January 17th, the first day, three keynote speeches were given as the opening session. On January 18th and 19th, "Workshop on Geospatial DRR for Decade of Action" and "Workshop on Operation, Maintenance and Applications of CORS" were held. On January 20th, the final day, a session titled "CORS utilization for DRR and other emerging fields by private companies" was held.

There were 511 pre-registrations from 87 countries (including 37 countries in the Asia-Pacific region, 18 countries in the European region, 19 countries in the African region and 13 countries in the Americas) from NGLAs, UN-GGIM and UN-GGIM-AP officials, the private sectors, academia, UN agencies, etc., and 410 participants connected to the conference during the four days of the conference. There were 511 pre-registrations from UN agencies and other organization, and 410 participants connected to the conference during the four days of the conference. It was an opportunity for the GSI to contribute to the SDGs through capacity development utilizing its expertise in geospatial information in the fields of GNSS utilization and disaster risk reduction, which was the main purpose of this conference.

1. Introduction

1.1 UN-GGIM

Established in 2011, the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) provides a forum for discussions, coordination, and promotion among Member States of the United Nations, international organizations, private organizations, and academic fields regarding the development and utilization of geospatial information. The Geospatial Information Authority of Japan (GSI) has attended each meeting as a representative of the Japanese government since the first meeting in 2011. As of August

2022, Japan serves as Co-Chair of the UN-GGIM Working Group on Geospatial Information and Services for Disasters (hereafter referred to as "WG-Disasters") and lead of its Task Group B, and is a member of the Subcommittee on Geodesy.

1.2 UN-GGIM-AP

The Regional Committee of United Nations Global Geospatial Information Management for Asia and the Pacific (hereafter referred to as "UN-GGIM-AP") is one of the regional committees of UN-GGIM. It consists of the National Geospatial Information Authorities

¹ Disaster Risk Reduction

² Resigned in March 2023

(hereafter referred to as "NGIA") of 56 countries and regions in the Asia-Pacific region. It conducts activities such as technical and practical discussions at the regional level with the aim of maximizing the economic, social and environmental benefits brought about by geospatial information in the Asia-Pacific region and reports its result to the UN-GGIM. In addition, the GSI is undertaking activities such as reporting the results to UN-GGIM. The plenary meeting of UN-GGIM-AP is held once a year, and the GSI has attended every meeting since the first plenary meeting in 2012. As of August 2022, Japan serves as Vice-President, Chair of the Global Geodetic Reference Frame Working Group, and Vice-Chair of the Working Group on the Integration of Geospatial Information and Statistics.

1.3 Major policies in international fields of the GSI

The GSI has registered 2 policies: the "Promotion of the Global Geodetic Reference Frame (GGRF)," and "promotion of partnerships using geospatial information" in the SDGs Action Plan compiled by the Japanese government's Sustainable Development Goals Promotion Headquarters. In addition, GSI has registered policies related to the Promotion of the GNSS CORS Network Introduction Overseas in the Japanese government's plans and strategies such as the Basic Plan for the Advancement of Utilizing Geospatial Information, the agenda of the Basic Plan on Space Policy, and the 2025 Policy Program for Promotion of Overseas Infrastructure System.

The Global Geodetic Reference Frame (GGRF), that expresses the precise shape of the earth and associated changes, will help ensure the accuracy and efficiency of various surveying and location information services, and contribute to sustainable development, disaster response, and disaster prevention. It also contributes to the formation of a sustainable and resilient national land. As a Co-Organizer of the resolution on the GGRF adopted by the United Nations General Assembly, Japan will: (1) transfer technology to developing countries concerning the development and management of the GGRF, (2) participate in the Subcommittee on Geodesy of the UN-GGIM, and (3) support the popularization of GGRF through such means as Global Geodetic Observation, which is coordinated internationally.

Regarding the "promotion of partnerships using geospatial information", the GSI will promote the use of geospatial information in various fields such as disaster prevention through domestic and international partnerships, including collaboration with the UN Open GIS Initiative, UN-GGIM, local governments, and

industry-academia-government collaboration.

Regarding the "promotion of the GNSS CORS Network introduction overseas", the GSI has more than 20 years of experience in the operation of the GNSS Earth Observation Network System (GEONET), providing stable continuous observation and high-precision GNSS survey standards. The GSI, which has strengths such as releasing data to the private sector and deploying it to a wide range of location-based services, is aiming to develop services overseas that utilize the Quasi-Zenith Satellite System, a Japanese navigation satellite system. It also promotes efforts such as supporting the introduction and operation of the GNSS CORS Network.

1.4 Background to Holding the Geospatial Capacity Development Conference on GNSS Applications and DRR

Based on the current position of the GSI and the policies to be implemented as described in 1.1 to 1.3, as well as the surveying technology in which the GSI has superiority and the know-how it has accumulated so far, the GSI held the "Geospatial Capacity Development Conference on GNSS Applications and DRR (hereafter referred to as "GCDC")" with the aim of contributing to the Sustainable Development Goals (SDGs) through capacity development that makes use of our expertise in geospatial information in the fields of GNSS utilization and disaster risk reduction. The conference was held jointly by the GSI, UN-GGIM WG-Disasters, and UN-GGIM-AP.

This was carried out including the equivalent of the UN-GGIM WG-Disasters Conference 2020 (co-organized by the GSI, UN-GGIM WG Disasters, and UN-GGIM-AP), which was postponed due to the spread of the COVID-19 pandemic and could not be held in February 2020.

2. Overview of GCDC

2.1 Organizers

As mentioned previously, the conference was co-organized by the GSI, UN-GGIM WG-Disasters (co-chaired by the GSI), and UN-GGIM-AP (the GSI serves as Vice-President).

2.2 Dates and format of the conference

The conference was held from January 17th (Monday) to January 20th (Thursday), 2022 in an online format. In consideration of time differences, the conference was held in the afternoon of Japan time, with a maximum of 4 hours each day, with focus on countries

in the Asia-Pacific region.

2.3 Program

On the first day, January 17, as the opening session, the chair of the conference, Mr. Shoichi Oki, Director-General of Planning Department, Geospatial Information Authority of Japan, Co-Chair of UN-GGIM WG-Disasters, and Vice-Chair of UN-GGIM-AP gave opening remarks, followed by the welcome speech from Simon Costello, UN-GGIM-AP President. Three keynote speeches were then presented.

On January 18th and 19th, two workshops were held on the second half of each day. The first half of the workshop was titled "Workshop on Geospatial DRR for

the Decade of Action", and presentations were given by various entities such as NGIAs from various countries, international organizations, charities, and the academic sector, including students. The second half of the workshop was titled "Workshop on the Operation, Maintenance, and Applications of CORS" and provided information on the current status and issues of GNSS CORS Network in each country and shared Japan's experiences.

The final day, January 20, was titled "CORS utilization for DRR and other emerging fields by private companies", and introduced technologies and initiatives taken at the Japanese private sectors. Details of the program are as follows.

Table 1 Geospatial Capacity Development Conference on GNSS applications and DRR

January 17 (Mon)	
15:30-15:35	Welcome
-Opening Session-	
Session Chair: Shoichi Oki , Co-Chair of UN-GGIM WG-Disasters, Vice-President of UN-GGIM-AP and Director-General of Planning Department of GSI	
15:35-15:40	Opening Remarks Shoichi Oki Co-Chair of UN-GGIM WG-Disasters, Vice-President of GGIM-AP Director-General of Planning Department of GSI
15:40-15:45	Welcome Speech Simon Costello President of UN-GGIM-AP Branch Head, National Location Information Geoscience Australia
15:45-15:50	Photo Session
15:50-16:15	Keynote Speech 1: Application of GNSS for Real-time Prediction of Geohazards and its Transformation to Disaster Information Yusaku Ohta Associate Professor, Research Center for Prediction of Earthquakes and Volcanic Eruptions, Graduate School of Science, Tohoku University
16:15-16:25	Break

16:25-16:50	Keynote Speech 2: The Utilization of GNSS for Disaster Risk Reduction Management in Indonesia: Status and Challenges Hasanuddin Z Abidin Department of Geodesy and Geomatics Engineering, Faculty of Earth Science and Technology, Institute of Technology Bandung, Indonesia
16:50-17:15	Keynote Speech 3: QZSS Services and Utilization Chie Deguchi Director, QZSS Strategy Office, National Space Policy Secretariat, Cabinet Office
17:15-17:30	Q and A
January 18 (Tue)	
-Workshop on Geospatial DRR for Decade of Action (Day 1)- Session Chair: Basara Miyahara , Director of Planning Division of Geodetic Department of GSI	
13:00-13:05	Welcome
13:05-13:25	The International Association of Geodesy's Global Geodetic Observing System: Supporting Innovative Geodetic Contributions to the Sendai Framework through International Collaborations and Advocacy Allison B Craddock Director, International GNSS Service Central Bureau and Manager of External Relations, IAG Global Geodetic Observing System
(*Canceled due to a volcanic eruption immediately before)	GNSS Capabilities for Disaster Risk Reduction-Tonga's Experience Viliami Tani Ma'ake Folau Deputy CEO, Corporate Services Division, Ministry of Lands and Natural Resources Tonga
13:25-13:45	GSI's Contribution to Disaster Risk Reduction Toru Nagayama Director-General of Geographic Department of GSI
13:45-13:55	Break
13:55-14:15	Utilization of GNSS Application and Geospatial Information to Disaster Risk Reduction in Bangladesh Debashish Sarker Assistant Director (Survey), Incharge, Geodetic Detachment, Survey of Bangladesh
14:15-14:35	GNSS and its Applications for Disaster Management - Perspectives from Australia John Dawson Director, Positioning Systems, National Positioning Infrastructure Branch, Place, Space and Communities Division, Geoscience Australia

14:35-15:00	Q and A
-Workshop on Operation, Maintenance and Applications of CORS (Day 1)-	
Session Chair: Basara Miyahara , Director of Planning Division of Geodetic Department of GSI	
15:30-15:35	Welcome (Brief explanation of the workshop)
15:35-15:50	Introduction of Project on Establishment of Continuously Operating Reference Stations (CORS) for Land Management and Infrastructure Development Chin Chharom Department Deputy Director, Geography Department, GDCG, MLMUPC (Cambodia)
15:50-16:05	The Introduction of Thai-Japan Collaboration on Pilot Project and the Aspect of Sharing Positioning & Location Based Services Towards Future Thai National Platform Thotsawat Fukiatistut GNSS Innovation Center Manager, GISTDA (Thailand)
16:05-16:20	Current Situation of VNGEONET and Actual Experience Tran Anh Tuan Chief of Division of Survey, Mapping and Geoinformation Technology Department of Survey, Mapping and Geoinformation of Vietnam
16:20-16:30	Break
16:30-16:45	CORS Infrastructure in the Philippines: Status, Challenges and Future Direction Ruel DM. Belen, MNSA Director, Mapping and Geodesy Branch, NAMRIA (Philippines)
16:45-17:05	Japanese GNSS CORS "GEONET" and its Operation and Maintenance Atsushi Yamagiwa Director of Satellite Geodesy Division of Geodetic Observation Center of GSI
17:05-17:20	CORS Operation and Data Service - Check points on infrastructure and operating works - Tetsuro Imakiire Senior Engineering Integrator, JENOBA Co. Ltd
17:20-17:30	Q and A
January 19 (Wed)	
-Workshop on Geospatial DRR for Decade of Action (Day 2)-	
Session Chair: Hidenori Fujimura , Director of Planning Division of Geospatial Information Department of GSI	
13:00-13:10	Welcome (Brief explanation)

13:10-13:40	Geospatial Service Requirements for Effective Humanitarian Response Alan Mills Map Action
13:40-13:50	Break
13:50-14:20	UNVT Community in Operation Taichi Furuhashi, Kuniharu Higano, Kohki Kikuchi and Shogo Hirasawa Aoyama Gakuin University
14:20-15:00	Q and A
-Workshop on Operation, Maintenance and Applications of CORS (Day 2)- Session Chair: Basara Miyahara, Director of Planning Division of Geodetic Department of GSI	
15:30-15:35	Welcome
15:35-15:55	Pilot Project on CORS Utilization UAV Photogrammetry Using CORS for Construction Survey in the Philippines Nami Seimiya PASCO CORPORATION
15:55-16:15	Plan of CORS Utilization Pilot Project in Indonesia Tadashi Sasakawa Kokusai Kogyo Co.,LTD.
16:15-16:25	Break
16:25-16:45	Partnership in Japanese Geospatial Information Society: Fundamentals for the Achievement of Advanced Utilization of Geospatial Information Hayato Fukuoka PASCO CORPORATION
16:45-17:05	Collaboration on CORS Network Development and Utilization in Asia and the Pacific Shinichi Sakabe Senior Advisor, Infrastructure Management Department, JICA (Japan)
17:05-17:10	Q and A
January 20 (Thu)	
-CORS Utilization for DRR and Other Emerging Fields by Private Companies- Session Chair: Basara Miyahara, Director of Planning Division of Geodetic Department of GSI	
15:30-15:35	Welcome
15:35-15:55	Satellite Data for Disaster Ryohei Kurokawa and Hajime Zama PASCO CORPORATION

15:55-16:15	Utilization of CORS for i-Construction's Workflows Naoyuki Tamaki and Midori Mibayashi TOPCON
16:15-16:25	Break
16:25-16:45	Utilization of CORS Data for MMS Naoyuki Tamaki and Midori Mibayashi TOPCON
16:45-17:05	Agricultural Use of Precise Position Data Shigemi Hidaka Yanmar Agribusiness Co., Ltd.
17:05-17:15	Q and A
-Closing Session-	
17:15-17:25	Closing Remarks Toru Nagayama Director-General of Geographic Department of GSI

2.4 Participants

As a result of calling for participation by NGIAs, UN-GGIM and UN-GGIM-AP officials, the private sectors, and the academic sectors, there were 511 registered participants from 87 countries (including 37 countries in the Asia-Pacific region, 18 countries in the European region, 19 countries in the African region, and 13 countries from the Americas) and UN agencies, and 410 participants connected to the conference during the four days of the conference. About 100 to 200 people participated in each session.

3. Summary of presentations in each session at GCDC

3.1 Opening session

In the opening remarks by Chair Shoichi Oki, following the condolences expressed for the eruption of the Tonga undersea volcano, a large-scale eruption and subsequent disaster just before the conference, stated that the purpose of the conference was to contribute to the achievement of the SDGs and in order to do this through expertise in the field, that is, capacity development, which is a major issue related to the SDGs in the framework of the UN-GGIM, various actors learn from each other and pool their efforts to help them solve their problems.

Simon Costello (President of UN-GGIM-AP) gave a welcome speech, following his condolences to Tonga and neighboring countries. He noted that the Asia-

Pacific region is a region prone to natural disasters, and that local communities in the coastal areas. He also said that there are expectations for the GNSS CORS Network and the use of various data for disaster prevention because of the high population density of the coastal areas, abnormal weather, sea-level rise, global warming, etc., which are risks to society.

Yusaku Ohta (Associate Professor, Research Center for Prediction of Earthquakes and Volcanic Eruptions, Graduate School of Science, Tohoku University) gave a keynote speech 1, in which he introduced a method that is being investigated of predicting tsunami height and tsunami arrival time from fault slips using GNSS observation data.

Hasanuddin Z. Abidin (Professor, Institute of Technology Bandung, Indonesia/Formal Head of BIG) gave a keynote speech 2. In which he stated that the damage caused by natural disasters such as earthquakes, floods, landslides, droughts, and storms is enormous in Indonesia, and provided an introduction as to how Indonesia is working on densifying the GNSS CORS network and One Map Policy in order to utilize GNSS for disaster risk reduction.

Chie Deguchi (Director, QZSS Strategy Office, National Space Policy Secretariat, Cabinet Office) gave a keynote speech 3 about GNSS, which is an important infrastructure indispensable for daily life. This included

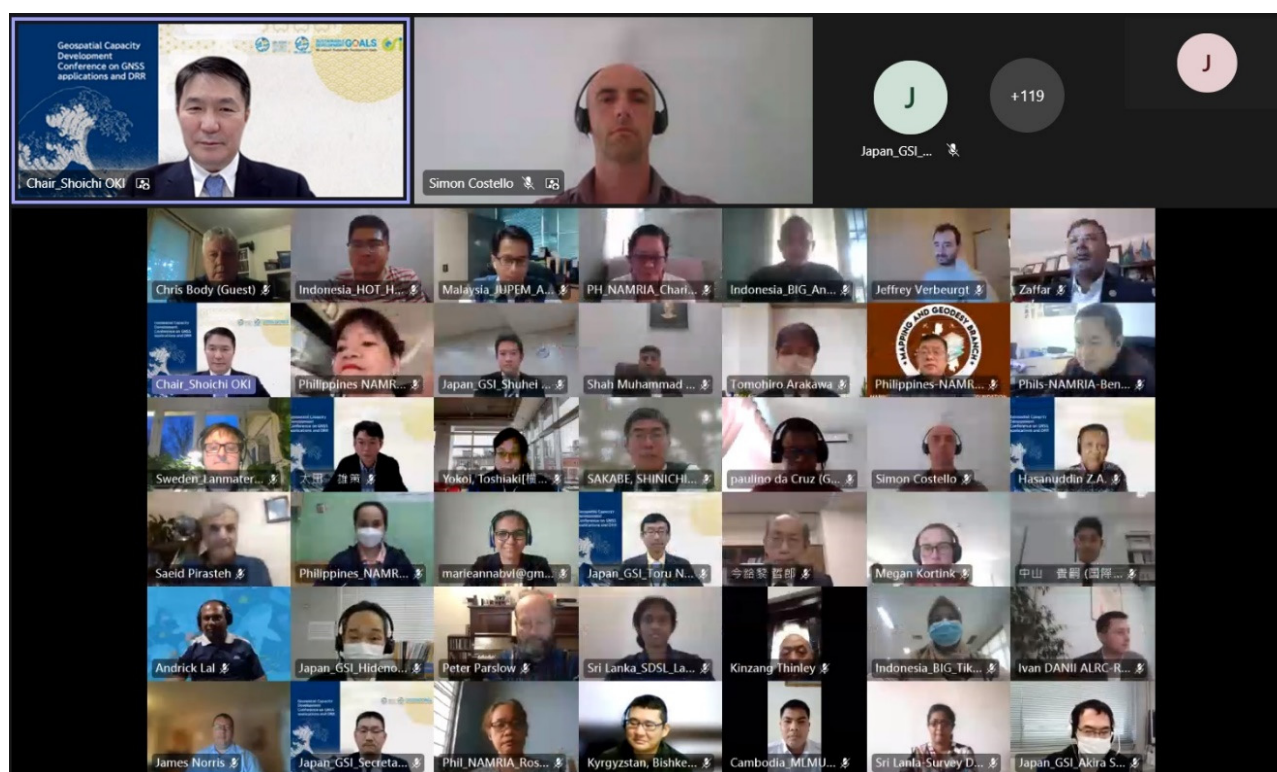


Photo 1 Photos of meeting participants

an overview of the Quasi-Zenith Satellite System (hereafter referred to as "QZSS"), services, and application examples.

3.2 Workshop on Geospatial DRR for Decade of Action (Day 1)

Allison B Craddock (IAG GGOS/ IGS) discussed international cooperation in GGOS to achieve highly accurate geodetic observation with limited resources in each country, especially geodesy for the Sendai Framework for Disaster Risk Reduction (Geodesy4Sendai), the application of geodesy for disaster risk reduction, capacity building, and training.

Toru Nagayama (Director-General, Geographic Department, GSI) clarified the relationships between disaster factors, geographical conditions, and hazards that lead to disasters based on Japan's experience as a disaster-prone country, and explained why geographic information is effective for disaster prevention. In addition to information on various thematic maps and Natural Disaster Monuments in Japan, GSI Maps and hazard map portal sites that provide them were introduced. Furthermore, he stated that efforts are being made to raise awareness of disaster preparedness, including disaster education in schools.

Debashish Sarker (Survey of Bangladesh) discussed the utilization of satellite data and geospatial

information for disaster prevention in Bangladesh, and trends and damage from disasters in the capital Dhaka. He also stated that they would like to work on issues such as management and operation of geospatial information, human resource development, infrastructure investment and integration of statistical data and geospatial data nationwide.

John Dawson (Geoscience Australia) is working on improving the accuracy of location information for the realization of Location-enabled Australia. He also introduced the VR technology using GNSS data at emergency response sites and the free distribution of real-time GNSS data and Multi-GNSS data via a web portal. In addition, he explained about the infrastructure (GNSS observation network, Global Geodetic Reference Frame, geoid) and software (precise ephemeris and clock determination, PPP, PPP correction information) that realize such data operation, and introduced a positioning service SBAS (satellite-based augmentation system), which is scheduled to launch in 2022.

3.3 Workshop on Operation, Maintenance and Applications of CORS (Day 1)

Chin Chharom (Geography Department, GDCG, MLMUPC (Cambodia)) noted that his department is in charge of surveying, mapping, and development of the GNSS CORS Network, and introduced construction and

operation of five GNSS CORSs and a data center, strengthening of the operation and maintenance system, and the JICA technical cooperation project "Project on Establishment of Continuously Operating Reference Stations (CORS) for Land Management and Infrastructure Development" aimed at promoting the use of the GNSS CORS Network.

Thotsawat Fukiatistut (GNSS Innovation Center, GISTDA (Thailand)) discussed the center's activities and introduced examples of pilot projects that utilize the GNSS CORS Network, such as drone operation in the production process of a factory that makes ethanol from cassava and an autonomous driving system of carts on a golfing course, in the JICA technical cooperation project "The Project for Capacity Development and Promotion of Utilization of National CORS Data Center". In addition, he reported that a roadmap for network management, data import, etc. is under consideration in order to expand the practical range of distributed data from the GNSS CORS Network.

Tran Anh Tuan (Survey, Mapping and Geoinformation of Vietnam) talked about the current status of operation and utilization of the GNSS CORS Network (VNGEONET) in Vietnam, including the current structure of operations, the free distribution of VNGEONET data, which started in 2019, and crustal movement analysis using VNGEONET data. He also mentioned lightning damage as an issue during the operation period, and said that he would like to learn about Japan's countermeasures.

Ruel DM. Belen, MNSA (NAMRIA (Philippines)) gave an explanation of the overall view, operation and maintenance of the GNSS CORS Network (PAGeNET) owned and operated by a partnership of industry-academia-government. In addition to an explanation of the management, he noted that the GNSS CORS Network data is currently being used in construction of the geodetic reference frame, surveying/mapping, and research activities in various fields such as geology, meteorology, and geodesy. He also stated that they would like to expand partnerships with related institutions and organizations in the future and promote utilization in application fields other than surveying and mapping.

Atsushi Yamagiwa (Director, Satellite Geodesy Division, Geodetic Observation Center, GSI) shared information on the operation and maintenance of GEONET in Japan. He also noted that GEONET is being modernized and strengthened as part of efforts to enhance resilience promoted by the Japanese government in order to reduce the damage that disasters inflict on public

infrastructure.

Tetsuro Imakiire (JENOBA Co. Ltd.) shared that the company's efforts to ensure a stable supply of the GNSS CORS Network data service, points to be noted in operation and maintenance, the division of roles between the public and private sectors, and the flow of service provision. He also opined that infrastructure management and user support are essential to ensure service quality.

3.4 Workshop on Geospatial DRR for Decade of Action (Day 2)

Hiddenori Fujimura (Director, planning Division, Geospatial Information Department, GSI), Session Chair, gave an overview of the UN-GGIM WG-Disasters and its Task Group B. He explained that the purpose is to share the current issues and barriers while citing actual examples, in order to achieve the higher goal of enhancing the community's disaster preparedness and emergency response capabilities.

Alan Mills (Map Action) stated that the organization is a charity organization composed of volunteers such as GIS operators, remote-sensing specialists, and data scientists. He noted that they provide assistance in various problems such as natural disasters, food insecurity issues, disease epidemics and conflicts. He explained that the processes of collecting data immediately after a disaster and collecting new data at the disaster site, as well as monitoring and evaluating aid activities through mapping to identify regions that have not received assistance are especially important. He continued that humanitarian assistance is not only carried out by government agencies, but also by NGOs and a broad range of civil society organizations, and that it is therefore necessary to make flexible decisions on relief supplies and forms of assistance in accordance with the situation.

Professor Taichi Furuhashi and his laboratory students (Aoyama Gakuin University), as members of the Humanitarian Open Street Map Team and the Crisis Mappers Japan, talked about the United Nations Vector Tile Toolkit (UNVT), the operation of drones for humanitarian assistance, and the functions of the UNVT toolkit that support offline environments in disaster response. His laboratory students provided a demonstration of an "anywhere offline map server".

3.5 Workshop on Operation, Maintenance and Applications of CORS (Day 2)

Nami Seimiya (PASCO Corporation) introduced that in a pilot project for utilizing CORS in the Philippines

implemented by the GSI, embankments were created at a construction site and the amount of soil was measured by UAV-based photogrammetry using the GNSS CORS Network was conducted. And it was confirmed that the working time was greatly shortened compared to the time required for by human operation, and that the safety of workers was enhanced.

Tadashi Sasakawa (Kokusai Kogyo Co., Ltd.) talked about local correction of the MADOCA service provided by QZSS in the CORS Utilization Pilot Project in Indonesia that was planned to be implemented by the GSI. In addition, he explained that a verification of the utilization of the GNSS CORS Network in i-Construction is being considered.

Hayato Fukuoka (PASCO Corporation) said that from the standpoint of a private company, they are examining elements that will further improve the utilization of geospatial information in the work of the GSI. There are three basic elements: the first is "the legal system," the second is "an adequate GNSS CORS Network," and the third is "the need to use geospatial information in disaster response."

Shinichi Sakabe (Infrastructure Management Department, JICA) said that JICA allocates a large amount of its budget to the Asia-Pacific region and emphasizes the importance of human resource development based on personal exchanges. He also presented a concept in which geodesy information and geospatial information will become the foundation that supports the society of the future, and the SDGs will be achieved by improving the efficiency of surveying work, as well as by maintaining and enhancing the GNSS CORS Networks which will bring about positive effects on society as a whole.

3.6 CORS utilization for DRR and other emerging fields by private companies

Private companies in Japan discussed examples and technologies for contributing to DRR using the GNSS CORS Network and other geospatial information, including the utilization of satellite images (automatic identification using AI and identification of landslides using SAR images, etc.), ALOS-3, the history and concept of the birth and development of i-Construction in Japan, the acquisition of high-density point cloud data by the Mobile Mapping System (MMS), and autopilot agricultural equipment.

4. Meeting summary

Participants were shared information about the current situation and issues of each country and Japan's experience and knowledge with respect to the development, operation, maintenance and utilization of the GNSS CORS Network, the utilization of geodetic technology and geospatial information for disaster risk reduction. In addition to contributing to the development of geospatial capabilities of participants, it was a valuable opportunity to promote the stable operation of the GNSS CORS Network in each country and the development of an environment in which Japanese companies can utilize the GNSS CORS in each country.

In addition, Jamaica, the UN-GGIM Secretariat and Co-Chair of WG-Disasters with Japan, sent a message of congratulations on the holding of the conference. Japan demonstrated its presence in the UN-GGIM framework by holding this conference.

Based on the strategies and plans of the Japanese government, the GSI will continue to contribute to various forums of the United Nations, other multilateral and bilateral cooperation etc., through capacity development and other efforts in areas where the GSI has strengths, and will work to enhance Japan's presence in these areas.