MEMBER REPORT
Japan

ESCAP/WMO Typhoon Committee
15th Integrated Workshop
Video Conference – Vietnam
1 – 2 December 2020

CONTENTS

I. Overview of tropical cyclones which have affected/impacted Member's area since the last Committee Session

1. Meteorological Assessment (highlighting forecasting issues/impacts)

In 2020, seven tropical cyclones (TCs) of tropical storm (TS) intensity or higher had come within 300 km of the Japanese archipelago as of 7 November*. The country was affected even by those that did not make landfall. The TCs are described below, with their tracks shown in Figure 1.
* The track/intensity commentary provided here is subject to change once best-track data are finalized.

(1) TY HAGUPIT (2004)
HAGUPIT formed as a tropical depression (TD) over the sea south of Okinawa at 00 UTC on 1 August and moved northwestward, and was upgraded to tropical storm (TS) intensity over the same waters 12 hours later. It was upgraded to typhoon (TY) intensity over the East China Sea at 06 UTC on 3 August. Keeping its northwestward track, it reached its peak intensity with maximum sustained winds of 70 kt and a central pressure of 975 hPa over the same waters at 15 UTC on 3 August and subsequently hit the coast of central China. It began to gradually turn in a clockwise direction and moved into the area over the Yellow Sea at 00 UTC on 5 August. HAGUPIT crossed the Korean Peninsula late on 5 August and transitioned into an extratropical cyclone over the sea east of the peninsula at 00 UTC on 6 August. It crossed the date line and had entered the Western Hemisphere by 18 UTC on 11 August.

(2) TS JANGMI (2005)
JANGMI formed as a tropical depression (TD) over the sea east of the Philippines at 18 UTC on 07 August 2020 and moved northward. It was upgraded to tropical storm (TS) intensity south of Okinawa at 18 UTC on 8 August and reached its peak intensity with maximum sustained winds of 45 kt and a central pressure of 994 hPa over the East China Sea at 09 UTC the next day. JANGMI gradually turned northeastward and had transitioned into an extratropical cyclone over the northern part of the Sea of Japan by 00 UTC on 11 August. It dissipated over the sea east of the Kuril Islands at 00 UTC on 15 August.

(3) TY BAVI (2008)
BAVI formed as a tropical depression (TD) over the sea south of Okinawa at 12 UTC on 21 August 2020 and initially moved northward. It was upgraded to tropical storm (TS) intensity over the same waters 12 hours later. After moving into the area over the East China Sea, it turned northeastward and was upgraded to typhoon (TY) intensity over the sea northwest of Okinawa Island at 03 UTC on 24 August. Accelerating north-northwestward, it reached its peak intensity with maximum sustained winds of 85 kt and a central pressure of 950 hPa in the northern part of the East China Sea at 00 UTC on 26 August. BAVI crossed the northern part of the Korean Peninsula on the same day and transitioned into an extratropical cyclone over northeastern China on 06 UTC 27 August before dissipating at 12 UTC on 29 August.

(4) TY MAYSAK (2009)
MAYSAK formed as a tropical depression (TD) over the sea east of the Philippines at 18 UTC on 27 August 2020. It was upgraded to tropical storm (TS) intensity over the same waters at 06 UTC on 28 August and moved westward. It was again upgraded to Typhoon (TY) intensity over the same waters at 12 UTC on 29 August and turned northward then northwestward. It reached its peak intensity with maximum sustained winds of 95 kt and a central pressure of 935 hPa over the East China Sea at 00

UTC on 1 September, and then gradually accelerated northward. MAYSAK crossed the Korean Peninsula with TY intensity late on 2 September and moved into the area over the Sea of Japan. It transitioned into an extratropical cyclone over the northern part of the Korean Peninsula at 06 UTC on 3 September and moved northwestward before dissipating over the lower Amur River basin by 06 UTC on 7 September.

(5) TY HAISHEN (2010)

HAISHEN formed as a tropical depression (TD) over the sea southeast of the Ogasawara Islands at 06 UTC on 31 August and initially moved southwestward. It was upgraded to tropical storm (TS) intensity over the same waters at 12 UTC on 1 September and gradually turned northwestward. HAISHEN was upgraded to Typhoon (TY) intensity over the sea southwest of the Ogasawara Islands at 18 UTC on 2 September and kept its northwestward track. It reached its peak intensity with maximum sustained winds of 100 kt and a central pressure of 920 hPa over the sea southeast of Minamidaitojima Island at 09 UTC on 4 September, then turned and accelerated north-northwestward, moving into the area over the East China Sea early on 6 September. It crossed the Korean Peninsula with TY intensity early on 7 September and moved into the area over the Sea of Japan. It transitioned into an extratropical cyclone over the northern part of the Korean Peninsula at 18 UTC on 7 September and dissipated over northeastern China at 12 UTC on 10 September.

(6) STS DOLPHIN (2012)

DOLPHIN formed as a tropical depression (TD) over the sea southeast of Minamidaitojima Island at 06 UTC on 20 September and moved north-northeastward. It was upgraded to tropical storm (TS) intensity over the same waters 21 hours later. Keeping its north-northeastward track, it was upgraded to severe tropical storm (STS) intensity at 00 UTC on 22 September over the sea south of Japan, and reached its peak intensity with maximum sustained winds of 60 kt and a central pressure of 975 hPa six hours later. Moving northeastward, DOLPHIN weakened to TS intensity east of Hachijojima Island at 00 UTC on 24 September and transitioned into an extratropical cyclone over the same waters six hours later. It dissipated over the sea east of the Kuril Islands at 06 UTC on 30 September.

(7) TY CHAN-HOM (2014)

CHAN-HOM formed as a tropical depression (TD) northeast of Okinotorishima Island at 12 UTC on 4 October 2020, and was upgraded to tropical storm (TS) intensity over the same waters 12 hours later. After moving north-northeastward, it took on a northwestward track and was upgraded to typhoon (TY) intensity east of Minamidaitojima Island at 06 UTC on 7 October. Maintaining this track, it began to turn in a clockwise at 12 UTC on 7 October and reached its peak intensity with maximum sustained winds of 70 kt and a central pressure of 965 hPa east of Yakushima Island at 12 UTC on 8 October. It weakened to TD intensity over the sea north of Chichijima Island at 00 UTC on 12 October and dissipated over the sea east of Japan at 00 UTC on 17 October.

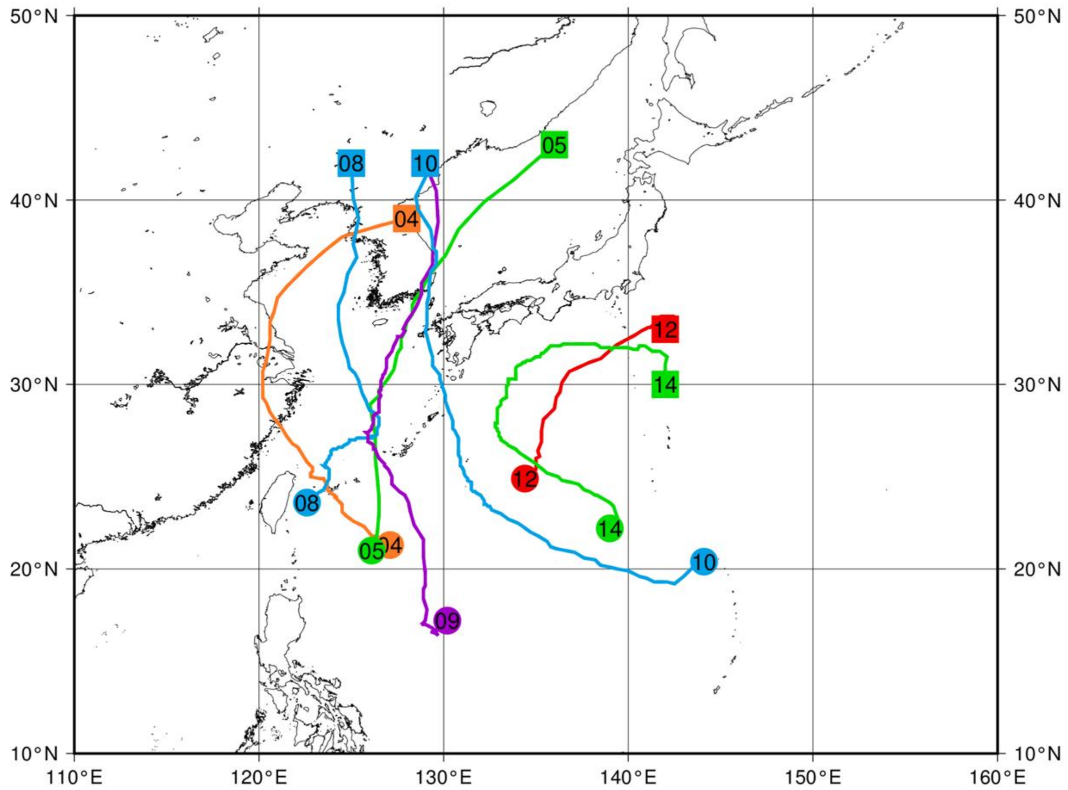


Figure 1 Tracks of the eight named TCs affecting Japan in 2020
Circles: genesis points of named TCs (showing the last two digits of the TC ID number); squares: dissipation points

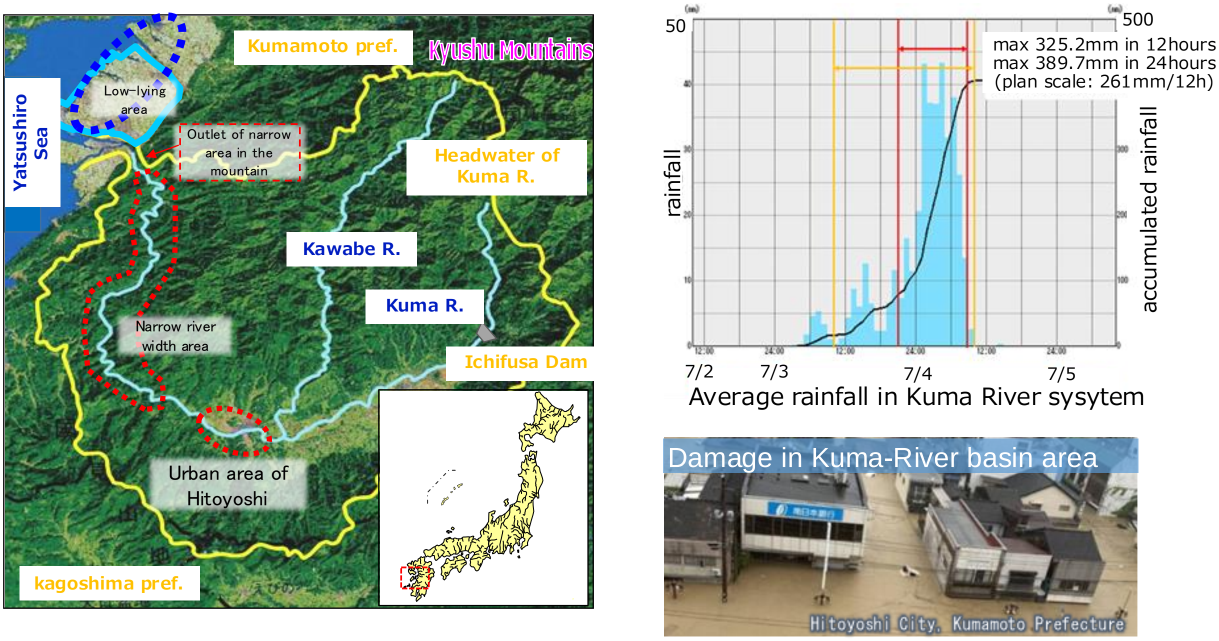
2. Hydrological Assessment (highlighting water-related issues/impacts)

Japan experienced one major water-related disaster in 2020.

1) July 2020 Torrential Rainfall

Unprecedented rainfall from July 3rd to 31st in Japan's Kumamoto Prefecture and elsewhere caused extensive flooding and levee breaches. At least 80 people died or remained unaccounted for, and around 14,000 houses were inundated.

The prefecture's flood-prone Kuma River has a geographical formation in which water flows downstream quickly into a bottleneck area, and the torrential rain exceeded capacity.



Note: The information above is based on the initial reports and is subject to change according to the future investigations.

Figure 2 July 2020 Torrential Rainfall outline

2) Typhoon Haishen (September 2020)

Typhoon Haishen was identified as extreme during its approach toward western Japan on September 7th and 8th, prompting preparations for its arrival as the strongest typhoon of the year. The preventive measures taken minimized damage from the event.

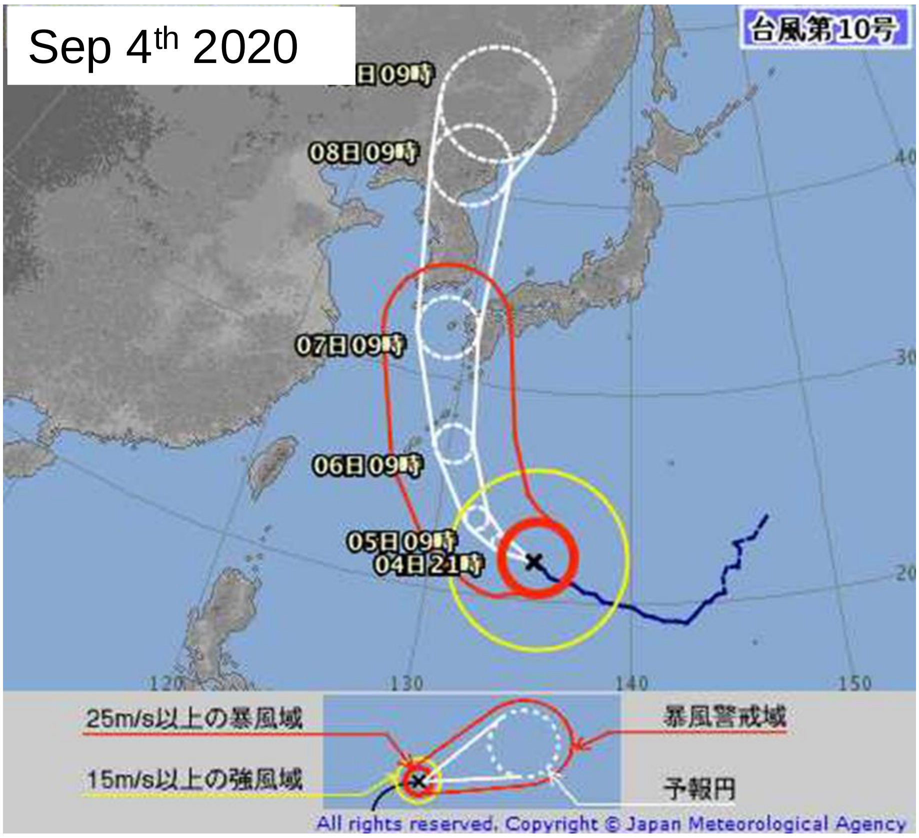


Figure 3 Path of Typhoon Haishen

3. Socio-Economic Assessment (highlighting socio-economic and DRR issues/impacts)

Damage from major typhoons in 2020

As of 8 a.m. on October 29, 19 typhoons had formed in the Western North Pacific basin, with 7 approaching the country.

The large and powerful Typhoon No. 10 approached the Nansei Islands and Kyushu from September 5 to 7 before making landfall on the Korean Peninsula and being classified as an extratropical cyclone at 3 a.m. on September 8.

A maximum wind speed of 44.2 m/s and a maximum instantaneous wind speed of 59.4 m/s were observed in the Nomozaki area of Nagasaki Prefecture, representing unprecedented conditions with strong or extremely strong winds in the Nansei Islands, Kyushu and elsewhere. Extreme maritime storm conditions were observed around these areas, with waves heights of 11.4 meters off the coast of Hyuga in Miyazaki Prefecture and 10.4 meters in Yakushima, Kagoshima Prefecture.

Total precipitation from September 4 to 7 at Mikado in Miyazaki Prefecture was 599.0 mm, and 24-hour precipitation exceeded 400 mm at four points in Miyazaki Prefecture. On the Pacific side of western and eastern Japan (far from the center of the typhoon), 24-hour precipitation exceeded 200 mm.

The typhoon resulted in 2 fatalities and left 4 people missing, as well as causing 111 injuries (16 serious) and 6 instances of serious residential damage, 849 instances of partial residential damage, 6 instances of flooding above floor level and 31 instances of flooding below floor level.

The event also caused damage to the electricity and water supply infrastructure, with up to 69,720 residences experiencing Kyushu Electric Power outages and up to 4,635 experiencing water supply outages.

4. Regional Cooperation Assessment (highlighting regional cooperation success and challenges)

1) (Side Event) Contribution from meteorology, hydrology and DRR for the Platform on Water Resilience and Disasters at the World Bousai Forum

Date: 11 (Mon.) November, 2019
Location: Sendai, Miyagi Prefecture, Japan
Host: Japan

2) ADBI-ICHARM Policy Dialogue – Water-related Disaster Resilience under Climate Change

Date: 27 (Mon.) – 28 (Tue.) January, 2020
Location: Tokyo, Japan

3) 4th Asia-Pacific Water Summit (postponed from October 2020)

Date: 23 (Sat.) – 24 (Sun.) April 2022
Location: Kumamoto, Kumamoto Prefecture, Japan
Theme: Water for Sustainable Development – Best Practices and Connecting to the Next Generation

II. Summary of Progress in Priorities supporting Key Result Areas

1. Commencement of five-day forecasts for TDs expected to have TS intensity within 24 hours

Main Text:

The RSMC Tokyo – Typhoon Center began to provide five-day forecasts for tropical depressions (TDs) expected to have tropical storm (TS) intensity within 24 hours on 9 September 2020 to provide accelerated disaster prevention support.

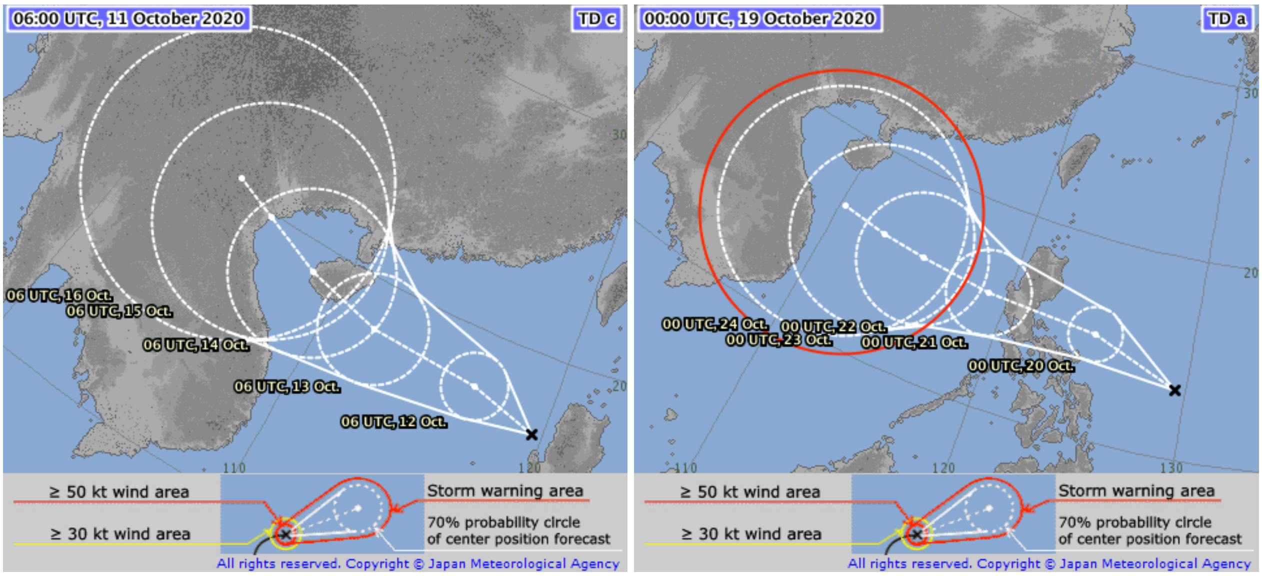


Figure 4 Forecasts for the TDs that developed into T2016 Nangka (left) and T2017 Saudel (right)

Identified opportunities/challenges, if any, for further development or collaboration:

Ongoing focus will be placed on improving forecast accuracy.

Priority areas addressed:

Enhance the capacity to monitor and forecast typhoon activities particularly in genesis, intensity and structure change.

Develop and enhance typhoon analysis and forecast technique from short- to long-term.

Promote communication among typhoon operational forecast and research communities in Typhoon Committee region.

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2. Upgrade of products on the RSMC Tokyo-Typhoon Center's Numerical Typhoon Prediction website

Main Text:
The RSMC Tokyo – Typhoon Center began providing the new/improved products detailed below on its Numerical Typhoon Prediction (NTP) website (http://tynwp-web.kishou.go.jp) on March 2020 (1 – 3) and September 2020 (4).

1. TIFS Monitor (TC intensity guidance)
RSMC Tokyo began providing tropical cyclone intensity forecast guidance products, including TIFS (the **T**yphoon **I**ntensity **F**orecasting scheme based on **S**HIPS) data created from the Statistical Hurricane Intensity Prediction Scheme (SHIPS).

2. Real-time verification results
Real-time verification of RSMC Tokyo's official forecasts, prediction results from global models and prediction results from intensity guidance schemes were made available on the website.

3. TC Activity Prediction with higher accuracy
RSMC Tokyo conducted parameter tuning for Tropical Cyclone Activity Prediction with accumulated data, leading to improved prediction accuracy.

4. Additional points for time-series charts representing ocean wave prediction
Five points were added to time-series charts representing ocean wave prediction based on an MMD request.

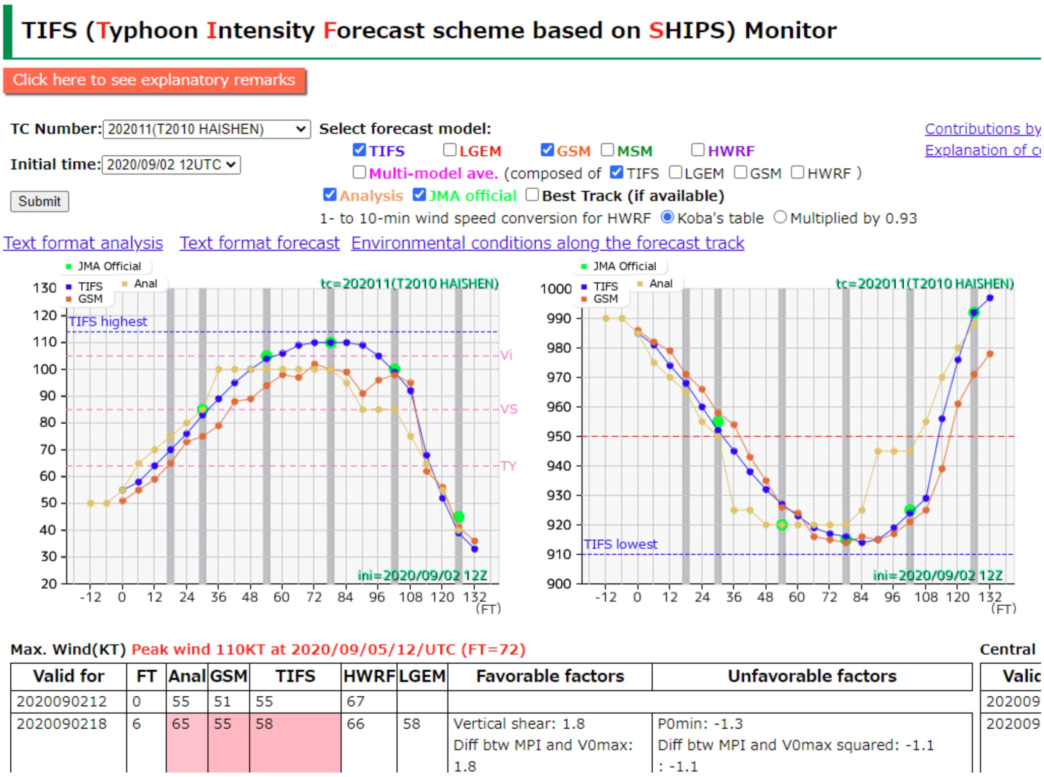

Figure 5 TIFS Monitor information added to the NTP website

Identified opportunities/challenges, if any, for further development or collaboration:
Ongoing improvement of the NTP website is considered beneficial to Members. Accordingly, Member feedback should be solicited for site enhancement and development.

Priority areas addressed:
Enhance the capacity to monitor and forecast typhoon activities particularly in genesis, intensity and structure change.
Enhance and provide typhoon forecast guidance based on NWP including ensembles and weather radar related products, such as QPE/QPF.
Enhance RSMC capacity to provide regional guidance including storm surge, responding to Member's needs.

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3. Updates on JMA's numerical weather prediction system

Main text:

1. Introduction of a new hybrid data assimilation system for the JMA Global Spectral Model

JMA applied its hybrid method, composed of a Local Ensemble Transform Kalman Filter (LETKF; Hunt et al. 2007) and 4D-Var, within its operational data assimilation system in December 2019. The LETKF, which is used to make initial perturbations in the Global Ensemble Prediction System (GEPS), was imported into the 4D-Var global data assimilation system to create a hybrid LETKF/4D-Var system. Three-hour ensemble forecasting initialized with the LETKF is used in 4D-Var with the extended control variable method of Lorenc (2003) to create flow-dependent background error covariances, which are blended with climatological background error covariances. Analysis from 4D-Var is used to re-center LETKF ensemble analysis.

2. Implementation of all-sky microwave radiance assimilation into JMA’s global NWP system

JMA’s all-sky microwave radiance assimilation scheme for microwave imagers and microwave water-vapor sounders (Kazumori and Kadowaki, 2017), including outer-loop iterations for trajectory updates in the 4D-Var minimization process for effective assimilation of cloud and precipitation, was introduced into the Agency’s operational global NWP system in December 2019.

3. Upgrade of JMA's global numerical weather prediction (NWP) system

JMA upgraded its Global Spectral Model (GSM; JMA 2019) in March 2020. The revision involved refinement of parametrized surface drag processes, land surface processes, surface albedo and stratocumulus on sea ice, which collectively resulted in better forecasting, especially in the Northern Hemisphere’s middle and high latitudes.

The first and second upgrades produced an 8% reduction in tropical cyclone (TC) track forecasting errors over the western North Pacific in the 12 – 60-hour forecast range (Figure 6).

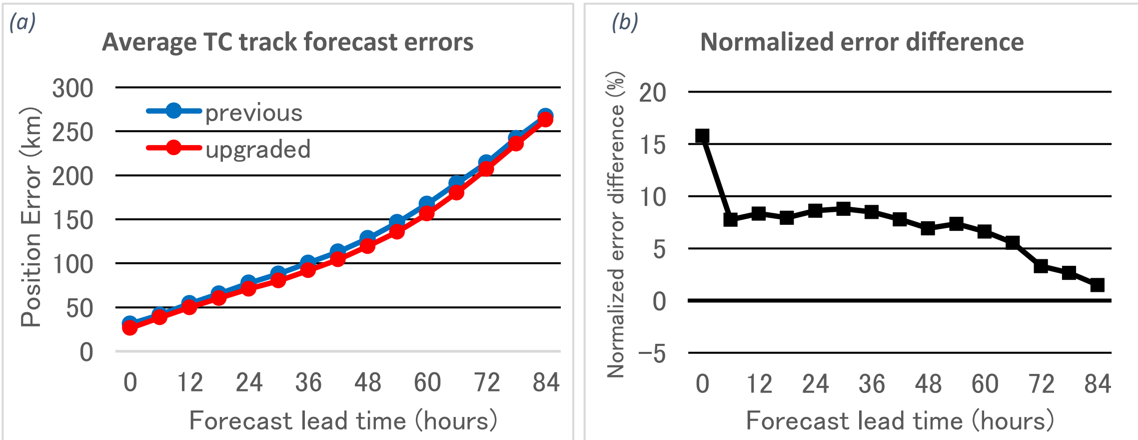

Figure 6: (a) Average TC track forecast errors of the GSM for the western North Pacific as a function of forecast time up to 84 hours. The red and blue lines represent positional errors for the upgraded and previous GSMs, respectively. (b) Normalized error difference of TC track forecast errors between the upgraded and previous GSMs.

References

Hunt, B. R., E. J. Kostelich, and I. Szunyogh, 2007: Efficient data assimilation for spatiotemporal chaos: a local ensemble transform Kalman filter. *Physica. D.*, **230**, 112 – 126.

Japan Meteorological Agency, 2019: Outline of Operational Numerical Weather Prediction at JMA. Japan Meteorological Agency, Tokyo, Japan.

Kazumori, M., T. Kadowaki, 2017: Development of an all-sky assimilation of microwave imager and sounder radiances for the Japan Meteorological Agency global numerical weather prediction system. *Tech. Proc. of 21st International TOVS Study Conference, Darmstadt, Germany 29 November – 5 December 2017.*
Lorenc, A. C., 2003. The potential of the ensemble Kalman filter for NWP: a comparison with 4D-Var. *Quart. J. Roy. Meteor. Soc.*, **129**, 3,183 – 3,203.

Identified opportunities/challenges, if any, for further development or collaboration:
Ongoing focus will be placed on improving NWP accuracy.

Priority areas addressed:
Enhance the capacity to monitor and forecast typhoon activities particularly in genesis intensity, and structure change.
Develop and enhance typhoon analysis and forecast technique from short to long term.
Promote communication among typhoon operational forecast and research communities in Typhoon Committee region.
Enhance, in cooperation with TRCG, training activities in accordance with Typhoon Committee forecast competency, knowledge sharing, and exchange of latest development and new techniques.

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4. Upgrade of temporal resolution for High-resolution Cloud Analysis Information (HCAI)

Main Text:

The Meteorological Satellite Center (MSC) of the Japan Meteorological Agency (JMA) provides its High-resolution Cloud Analysis Information (HCAI) satellite-derived product using data from the Advanced Himawari Imager (AHI) units on board the Himawari-8/-9 satellites. In December 2019, the temporal resolution of HCAI data was upgraded from hourly to every 10 minutes. HCAI data are provided to National Meteorological and Hydrological Services (NMHSs) via the JMA Data Dissemination System (JDDS) and to commercial users via the Japan Meteorological Business Support Center (JMBSC), and include information on cloud mask (including dust mask), snow and ice mask, cloud top height, cloud type and quality control. The generation algorithm used is largely derived from the cloud product algorithm developed by EUMETSAT/NWC-SAF (the Nowcasting Satellite Application Facility) and NOAA/NESDIS/STAR (the National Ocean and Atmospheric Administration/the National Environmental Satellite, Data, and Information Service/the Center for Satellite Applications and Research). The product elements are described in the Meteorological Satellite Center Technical Note at https://www.data.jma.go.jp/mscweb/technotes/msctechrep61-4.pdf.

Each element has a spatial resolution of 0.02 degrees in both latitude and longitude, and is calculated using observational data from Himawari-8 and -9. The regions of HCAI coverage are as detailed in Table 1 and Figure 7 below.

Table 1 HCAI regions and file sizes

Area		Latitude	Longitude	File size	Compressed file size
FD	Full Domain	60°N – 60°S	80°E – 160°W	180 MB	29.5 MB
NC	North Central	45°N – 20°S	90 – 155°E	50 MB	10 MB
NW	Northwest	60°N – 5°S	80 – 145°E	50 MB	10 MB
NE*	Northeast	60°N – 5°S	135°E – 160°W	50 MB	10 MB
TP	Tropical	25°N – 25°S	80°E – 160°W	75 MB	15 MB
TE	Tropical East	25°N – 25°S	135°E – 160°W	40 MB	7.5 MB
SW*	Southwest	5°N – 60°S	80 – 145°E	50 MB	10 MB
SE	Southeast	5°N – 60°S	135°E – 160°W	50 MB	10 MB

*No data provision due to an absence of users

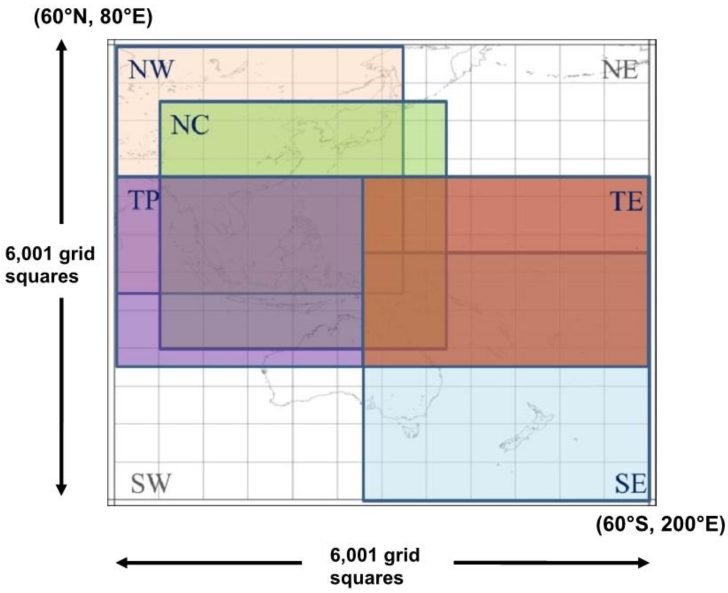

Figure 7 High-resolution Cloud Analysis Information (HCAI) regions

Registered users can access HCAI data via JDDS. The registration form and relevant information can be found at https://www.jma.go.jp/jma/jma-eng/satellite/jdds.html.

Identified opportunities/challenges, if any, for further development or collaboration:
Products should be further enhanced in line with user needs.

Priority areas addressed:
Enhance collaborative activities with other regional/international frameworks/organizations, including TC and PTC cooperation mechanism.
Enhance the capacity to monitor and forecast typhoon activities particularly in genesis, intensity and structure change.

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5. TCC products and publications related to tropical cyclones

Main text:

The Tokyo Climate Center (TCC) issues a variety of weekly, monthly and annual online reports on extreme weather and climate events worldwide, including heatwaves, heavy precipitation and tropical cyclones (https://ds.data.jma.go.jp/gmd/tcc/tcc/products/climate/).

TCC also provides online analysis and diagnosis of the Madden-Julian Oscillation (MJO; a well-documented large-scale climate system propagating eastward in the tropics) and other types of global atmospheric circulation. This instrumental resource is intended to help monitor and clarify changes in the likelihood of tropical cyclogenesis on intra-seasonal time scales, as the MJO is a substantial influence on tropical cyclogenesis potential in the western North Pacific.

The climate-related quarterly TCC Newsletter delivers El Niño outlooks, seasonal predictions for the coming summer/winter, summaries and discussions of Asian summer/winter monsoons, reports on extreme climate events worldwide and other content relevant to the climate community. TCC News No. 62 published in early December 2020 provides a summary of the 2020 Asian summer monsoon with details of temperature and precipitation anomalies and overall monsoon/tropical cyclone activity throughout the season.

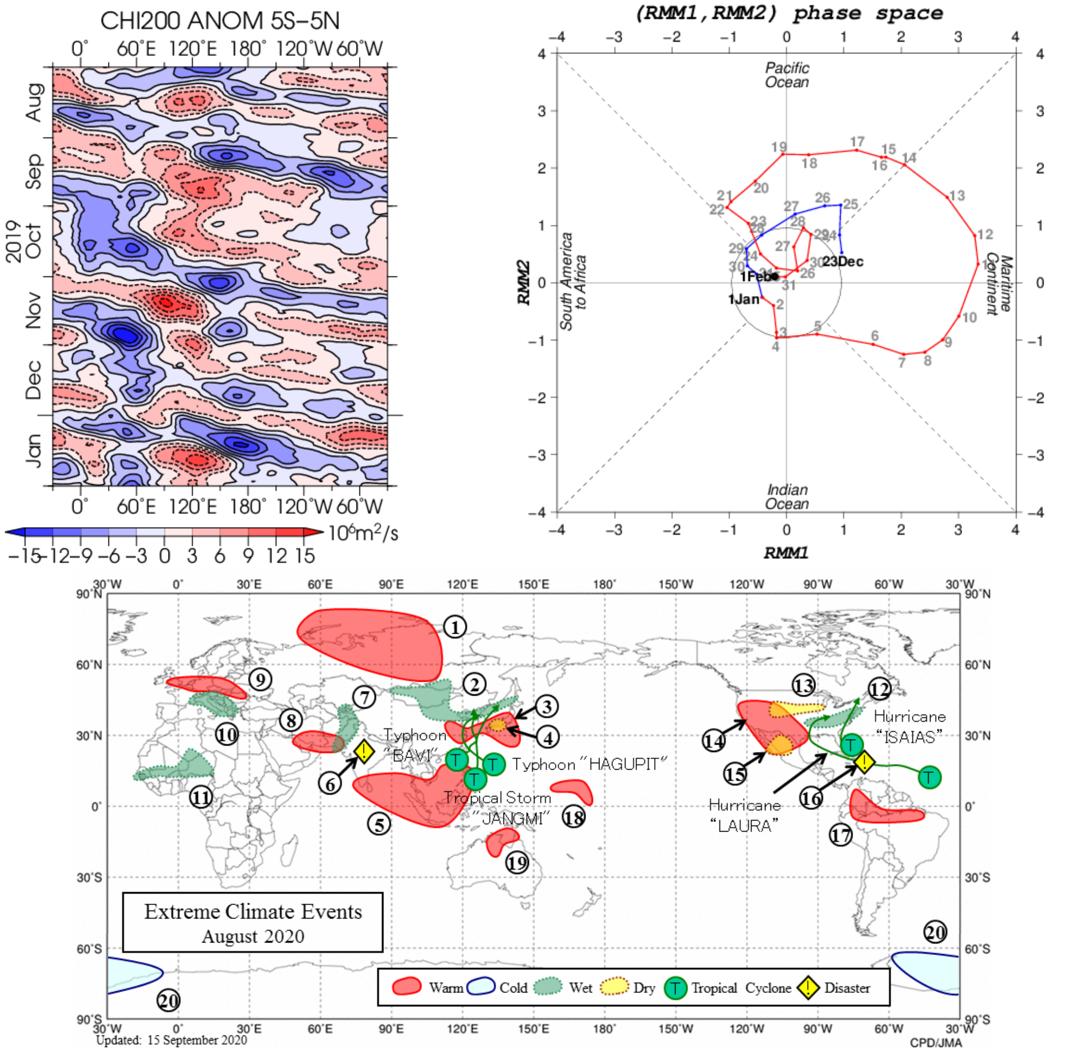

Figure 8. top left: Hovmöller diagram depicting a time-longitude section of convective activity anomalies; top right: phase diagram indicating MJO amplitude and propagation; bottom: global extreme weather/climate events for August 2020

Identified opportunities/challenges, if any, for further development or collaboration:
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Priority areas addressed:
Enhance collaborative activities with other regional/international frameworks/organizations, including TC and PTC cooperation mechanism.
Enhance the capacity to monitor and forecast typhoon activities particularly in genesis, intensity and structure change.

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6. Direction of River Basin Disaster Resilience and Sustainability by All

Main text:
After Typhoon Hagibis, MLIT shifted its focus to mainstream public disaster prevention and mitigation, with work on transition to River Basin Disaster Resilience and Sustainability by All. The approach involves a new concept for flood management in collaboration with relevant parties around river basins based on the major considerations of disaster resilience, inclusiveness and sustainability. Against this background, MLIT is upgrading its flood management plans in consideration of expected impacts from climate change.

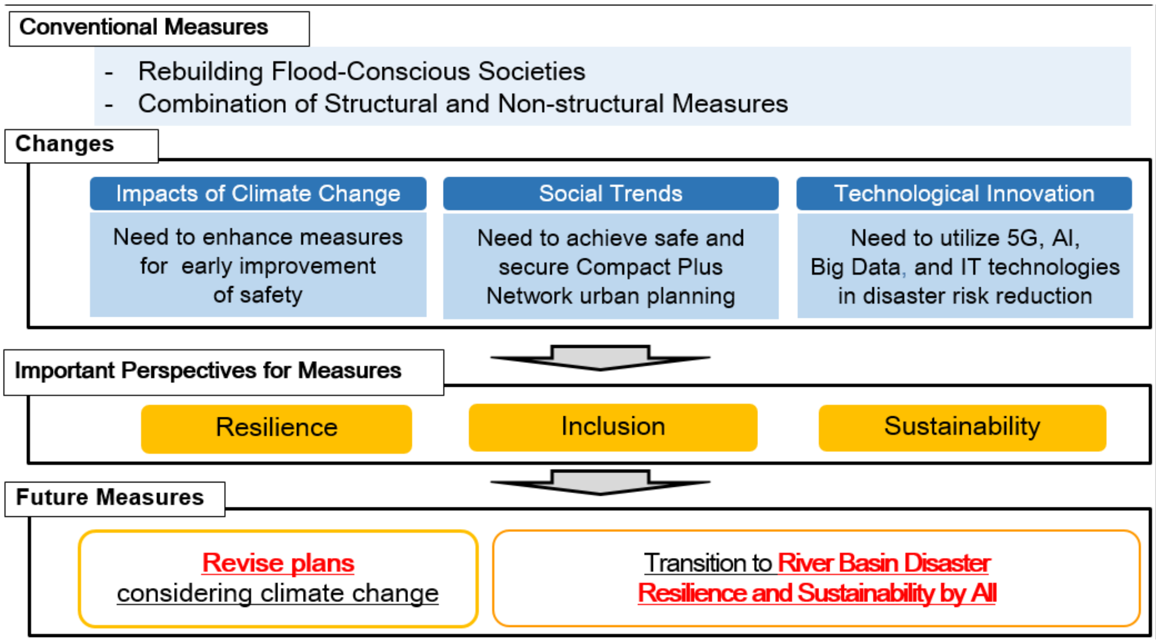

Figure 9 Overview of River Basin Disaster Resilience and Sustainability by All

Examples of preventive measures relating to Japan's July 2020 Heavy Rain event

1) Technical Emergency Control Force (TEC-FORCE)
TEC-FORCE provides smooth and swift technical support, with aims such as helping governments to obtain damage information quickly, limit damage and get life back to normal in affected areas as soon as possible.

Figure 10 TEC-FORCE activity

2) MLIT/JMA collaboration
The Regional Bureau of MLIT and the Regional Headquarters of JMA collaborate on the issuance of TV typhoon forecasts/warnings to support effective disaster mitigation in the fields of meteorology, hydrology and DRR.

3) Preliminary discharge
Preliminary water discharge is conducted in dam operation to secure capacity for flood control. This helped to support water supply and electricity generation during the July 2020 Heavy Rain event.

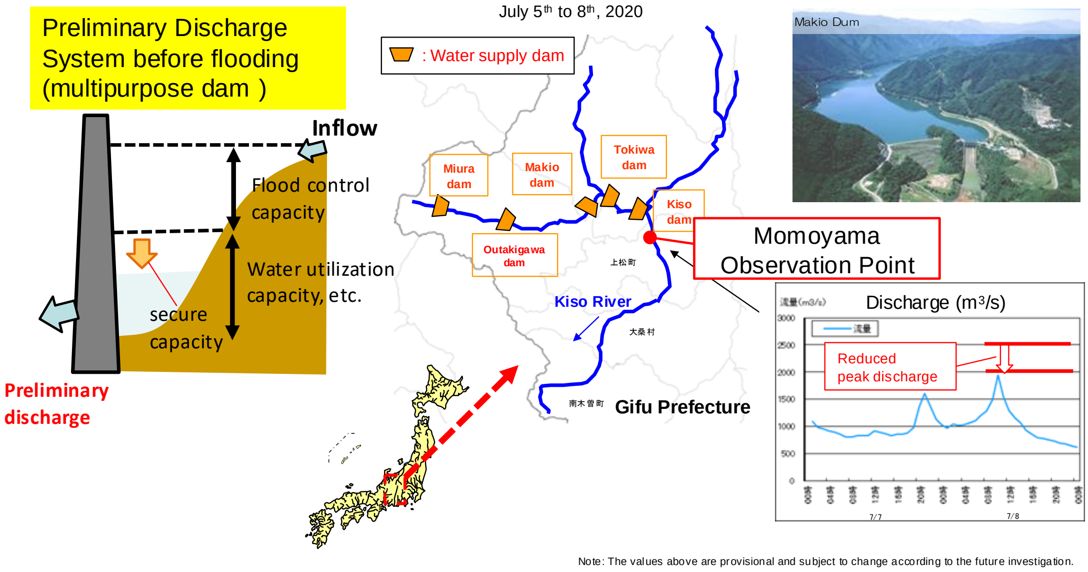

Figure 11 Effects of preliminary discharge

Identified opportunities/challenges, if any, for further development or collaboration:
Further information will be shared as good cases on water-related disaster resilience by all

Priority areas addressed:
Strengthen cross-cutting activities among working groups in the committee
Enhance capacity in typhoon-related flood risk management (including dam operation), integrated water resources management and flood-water utilization

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7. Organization of the 9th TC WGH Meeting (online), 22 October 2020

Main text:
The 9th Meeting of the Typhoon Committee Working Group on Hydrology (WGH) was hosted online on October 22 2020 by Japan's Ministry of Land, Infrastructure, Transport and Tourism and chaired by Dr. Ikeda from ICHARM (the International Centre for Water Hazard and Risk Management). It was originally planned as a venue event to be held in Kumamoto, Japan, in conjunction with the 4th Asia-Pacific Water Summit, which has been postponed until 2022.
The meeting went ahead with over 30 attendees from 10 countries/regions on the theme of Knowledge Sharing on Water-related Disaster Risk Reduction under Climate Change and COVID-19. Presentations were given on individual countries' situations and Annual Operating Plans.

Figure 12 9th WGH Meeting group photo

Identified opportunities/challenges, if any, for further development or collaboration:
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Priority Areas Addressed:
Enhance collaborative actives with other regional / international frameworks/organizations, including TC and PTC cooperation mechanism.

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8. Asian Conference on Disaster Reduction (ACDR) 2020

Main text:
The Asian Disaster Reduction Center (ADRC) organized an annual international conference, which was held online with written materials and an online webinar from 20 to 22 October 2020. The event was virtually attended by disaster risk management officials from member countries and disaster experts from international organizations to promote discussion and idea sharing, and helped to enhance partnerships among related countries and organizations.

The event was jointly organized by the Government of Japan and ADRC, whose 120+ panelists and attendees included high-level government officials from member countries as well as representatives of international and regional organizations, the academic community and the private sector. ACDR2020 video content is available on YouTube (links below) until 31 December 2020.

Day 1 (Oct. 20) – Opening and keynotes: https://youtu.be/oh1rd3MtPC0
Day 2 (Oct. 21) – Session 1: https://youtu.be/kjeUsB0SyLA
Day 3 (Oct. 22) – Session 2: https://youtu.be/hJbd9OLyWag

Key agenda items included:
1. DRR Measures and Challenges to the Intensifying Disaster Risks
2. Disaster Preparedness and Response Measures Amidst COVID-19

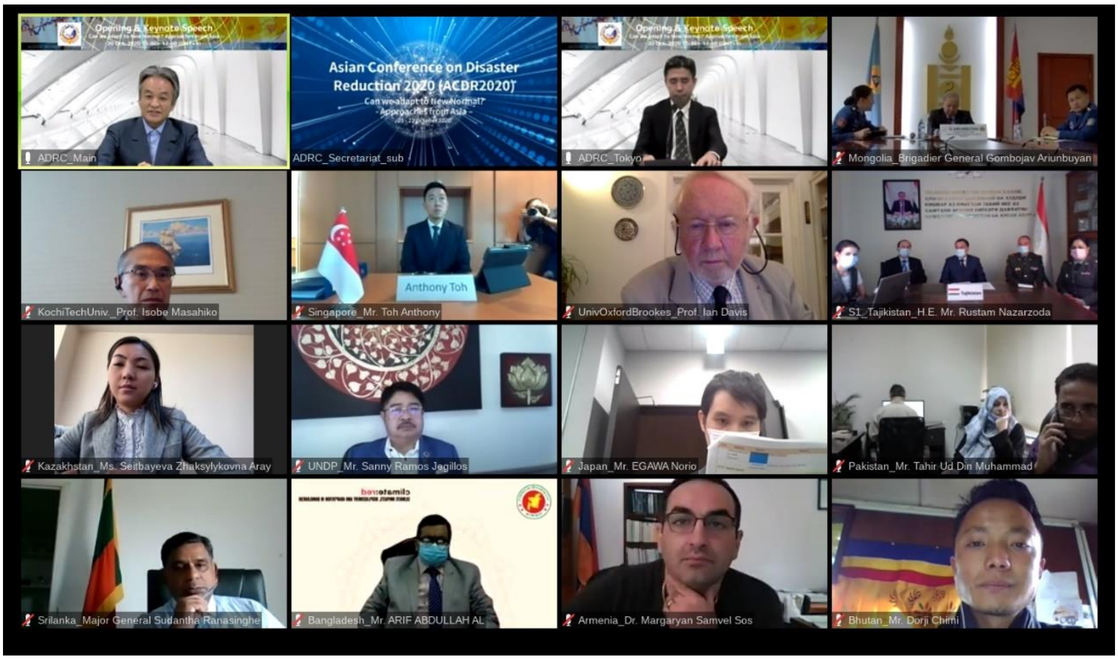

Figure 13 ACDR 2020 webinar attendees

Identified opportunities/challenges, if any, for further development or collaboration:
ACDR2020 discussions focused on common challenges faced by member countries and significant issues in the implementation of SFDRR and the SDGs in consideration of disaster scales and the COVID-19 pandemic.

Priority areas addressed:
Enhance collaborative activities with other regional/international frameworks/organizations, including TC and PTC cooperation mechanism.

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9. Visiting researchers from ADRC Member Countries

Main Text:
Since 1999 the Asian Disaster Reduction Center (ADRC) has hosted 117 Visiting Researchers (VR) from 27 member countries (as of April 2020).

The Visiting Researcher Program is intended to strengthen VR capacity for disaster risk reduction (DRR) and further promote collaboration between their countries and ADRC. Program graduates are expected to contribute to the development of disaster reduction capacity in their countries.

The program provides education on DRR and technology from Japan and member countries through DRR experts and facilities. However the VR program in FY 2020 is currently on hold due to COVID-19. It will be re-started when safety of this issue is confirmed.

FY	Organization	Country
2019	Dankook University	Korea
	Disaster and Emergency Management Presidency	Turkey
	District Disaster Management Office in Dagana	Bhutan
	Ministry of Disaster Management	Sri Lanka
	National Emergency Operation Centre	Nepal
	Department of Disaster Prevention and Mitigation	Thailand
2020	TBC	

Figure 14 Visit to the Cabinet Office at the Government of Japan

Identified opportunities/challenges, if any, for further development or collaboration:
The program will focus on VR research plans and post-event networking between VRs and ADRC to strengthen DRR activity.

Priority areas addressed:
Enhance collaborative activities with other regional/international frameworks/organizations, including TC and PTC cooperation mechanism.

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