MEMBER REPORT
Japan

ESCAP/WMO Typhoon Committee
16th Integrated Workshop
(Video conferencing)
2-3 December 2021

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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 2021, 11 tropical cyclones (TCs) of tropical storm (TS) intensity or higher had come within 300 km of the Japanese archipelago as of 5 November*, with the 3 that made landfall particularly affecting the country. The TCs are described below (tracks: Figure 1).
*The track/intensity commentary provided here is subject to change once best-track data are finalized.

(1) TY SURIGAE (2102)
SURIGAE formed as a tropical depression (TD) over the sea around the Caroline Islands at 18 UTC on 12 April 2021, it moved northwestward and was upgraded to tropical storm (TS) intensity over the same waters at 18 UTC on 13 April. Keeping its northwestward track, it was upgraded to typhoon (TY) intensity northeast of the Palau Islands at 12 UTC on 15 April. It reached peak intensity with maximum sustained winds of 120 kt and a central pressure of 895 hPa over the sea east of the Philippines at 18 UTC on 17 April. It started to gradually weaken on 18 April, turned northward around 00 UTC on 19 April and then northeastward around 00 UTC on 22 April over the sea northeast of Luzon Island, before heading southeastward around 12 UTC on 23 April over the sea south of Okinawa Island. It had transitioned into an extratropical cyclone over the sea south of Japan by 00 UTC on 25 April. After accelerating northeastward, it turned eastward over the sea east of the Kuril Islands around 00 UTC on 28 April and had crossed longitude 180 degrees east before 18 UTC on 30 April.

(2) TS CHOI-WAN (2103)
CHOI-WAN formed as a tropical depression (TD) over the sea around the Caroline Islands at 00 UTC on 29 May 2021 and moved westward. It turned northwestward over the same waters on 30 May, and was upgraded to tropical storm (TS) intensity over the sea east of Mindanao at 18 UTC the same day. It reached its initial peak intensity with maximum sustained winds of 40 kt and a central pressure of 998 hPa over the same waters at 18 UTC on 31 May. After passing over the central part of the Philippines with weakened maximum sustained winds of 35 kt, it moved over the South China Sea late on 2 June, reaching its second peak intensity with maximum sustained winds of 40 kt and a central pressure of 998 hPa at 00 UTC on 3 June. The next day it turned northeastward over the same waters, and had transitioned into an extratropical cyclone over the East China Sea by 06 UTC on 5 June. It dissipated over the sea south of Japan at 06 UTC on 6 June.

(3) TY CHAMPI (2105)
CHAMPI formed as a tropical depression (TD) around the Chuuk Islands at 00 UTC on 20 June 2021. It moved west-northwestward and then gradually turned northward around the Mariana Islands. It was upgraded to tropical storm (TS) intensity over the sea west of the Mariana Islands at 00 UTC on 23 June. After moving over the same waters, it reached Severe Tropical Storm (STS) intensity 24 hours later. It subsequently moved northward and reached typhoon (TY) intensity with maximum sustained winds of 65 kt and a central pressure of 980 hPa over the sea south of Japan at 06 UTC on 25 June. It had gradually been downgraded to TS intensity over the same waters by 18 UTC on 26 June. It then accelerated north-northeastward and transitioned into an extratropical cyclone over the sea east of Japan by 18 UTC on 27 June. It turned northeastward and dissipated over the sea far off east of Japan at 00 UTC on 29 June.

(4) TY IN-FA (2106)
IN-FA formed as a tropical depression (TD) over the sea east of the Philippines at 18 UTC on 15 July 2021 and moved northward. It was upgraded to tropical storm (TS) intensity near Minamidaitojima Island over the sea south of Japan at 12 UTC on 17 July and moved northwestward. Changing track westward, it was further upgraded to typhoon (TY) intensity over the sea south of Okinawa Island at 12 UTC on 20 July. Before sharply turning northwestward, it reached peak intensity with maximum sustained winds of 85 kt and a central pressure of 950 hPa over the same waters at 18 UTC on 21 July. After turning northwestward and moving over the East China Sea, it hit the coast of central China with severe tropical storm (STS) intensity late on 25 July. It weakened to TD intensity over central China at 18 UTC on 27 July and had transitioned into an extratropical cyclone by 18 UTC on 29 July. After moving northeastward, it dissipated over northeastern China at 12 UTC on 31 July.

(5) TS NEPARTAK (2108)
NEPARTAK formed as a tropical depression (TD) over the sea around the Ogasawara Islands at 12 UTC on 22 July 2021 and moved northeastward. It was upgraded to tropical storm (TS) intensity west of Minamitorishima Island at 12 UTC on 23 July. It reached peak intensity with maximum sustained winds of 40 kt 24 hours later and moved northwestward thereafter. Its central pressure of 994 hPa at 12 UTC on 24 July lowered to 990 hPa at 18 UTC on 26 July when it turned northward over the sea east of Japan. It landed around Ishinomaki City in Miyagi Prefecture with TS intensity before 21 UTC on 27 July and shifted northwestward the next day. It had transitioned into an extratropical cyclone over the Sea of Japan by 06 UTC on 28 July and dissipated over the same waters at 12 UTC on 31 July.

(6) TS LUPIT (2109)
LUPIT formed as a tropical depression (TD) over the South China Sea at 12 UTC on 2 August 2021 and moved eastward. It was upgraded to tropical storm (TS) intensity over the same waters at 00 UTC on 4 August. It gradually turned north-northeastward and hit southern China with TS intensity early on 5 August and moved northeastward. After crossing the Taiwan Strait on 6 August, it moved over the East China Sea at around 00 UTC on 7 August. Keeping its northeastward track and TS intensity, it made landfall on Makurazaki City in Kagoshima Prefecture just after 11 UTC on 8 August, reaching peak intensity with maximum sustained winds of 45 kt and a central pressure of 984 hPa over the sea between Honshu Island and Shikoku Island seven hours later. It made landfall again on Kure City in Hiroshima Prefecture with TS intensity after 20 UTC the same day and had transitioned into an extratropical cyclone over Tottori Prefecture by 00 UTC on 9 August. It moved over the Sea of Japan, then after crossing the northern part of Honshu Island moved east-northeastward and dissipated over the sea south of the Aleutian Islands at 00 UTC on 16 August.

(7) TS MIRINAE (2110)
MIRINAE formed as a tropical depression (TD) over the sea south of Okinawa at 06 UTC on 3 August 2021 and moved northeastward. It was upgraded to tropical storm (TS) intensity around Okinawa Island at 06 UTC on 5 August and moved eastward. Gradually turning northeastward, it reached peak intensity with maximum sustained winds of 50 kt and a central pressure of 980 hPa around Hachijojima Island at 18 UTC on 7 August. It gradually turned eastward and had transitioned into an extratropical cyclone over the sea far off east of Japan by 00 UTC on 10 August. It dissipated over the same waters at 06 UTC on 11 August.

(8) TS OMAIS (2112)
OMAIS, after forming as a tropical depression (TD), it was upgraded to tropical storm (TS) intensity over the sea east of the Philippines at 12 UTC on 20 August 2021 and moved northwestward. It reached peak intensity with maximum sustained winds of 50 kt and a central pressure of 998 hPa at 18 UTC on 21 August. Its central pressure lowered to 994 hPa over the sea

south of Okinawa Island at 04 UTC on 22 August. It subsequently changed track northeastward and had transitioned into an extratropical cyclone over the Sea of Japan by 00 UTC on 24 August.

(9) TY CHANTHU (2114)

CHANTHU, after forming as a tropical depression (TD), it was upgraded to tropical storm (TS) intensity over the sea east of the Philippines at 00 UTC on 7 September 2021 and moved westward. Three hours after being upgraded to severe tropical storm (STS) intensity at 12 UTC the same day, it was further upgraded to typhoon (TY) intensity. It reached peak intensity with maximum sustained winds of 115 kt at 12 UTC on 10 September and a central pressure of 910 hPa. Its central pressure lowered to 905 hPa around the Luzon Strait three hours later. It subsequently moved northeastward, and after turning sharply southeastward it turned in a clockwise direction over the East China Sea and moved northeastward. It subsequently turned eastward and had transitioned into an extratropical cyclone over the sea south of Japan by 06 UTC on 18 September.

(10) TS MINDULLE (2116)

MINDULLE, after forming as a tropical depression (TD), it was upgraded to tropical storm (TS) intensity over the sea west of Guam at 12 UTC on 23 September 2021 and moving northwestward. After being upgraded to severe tropical storm (STS) intensity over the sea east of the Philippines at 12 UTC on 24 September, it was further upgraded to typhoon (TY) intensity at 00 UTC on 25 September. It reached peak intensity with maximum sustained winds of 105 kt and a central pressure of 920 hPa over the same waters at 06 UTC on 26 September. After moving northwestward, it turned northeastward and had transitioned into an extratropical cyclone over the sea east of Japan by 00 UTC on 2 October.

(11) TS MALOU (2120)

MALOU, after forming as a tropical depression (TD), it was upgraded to tropical storm (TS) intensity over the sea east of the Philippines at 00 UTC on 25 October 2021 and moving northward. It was upgraded to severe tropical storm (STS) intensity at 12 UTC on 26 October and further to typhoon (TY) intensity at 18 UTC on 27 October. It reached peak intensity with maximum sustained winds of 105 kt and a central pressure of 965 hPa over the waters around the Ogasawara Islands at 09 UTC on 28 October. Keeping its northeastward track, it had transitioned into an extratropical cyclone over the sea east of Japan by 12 UTC on 29 October.

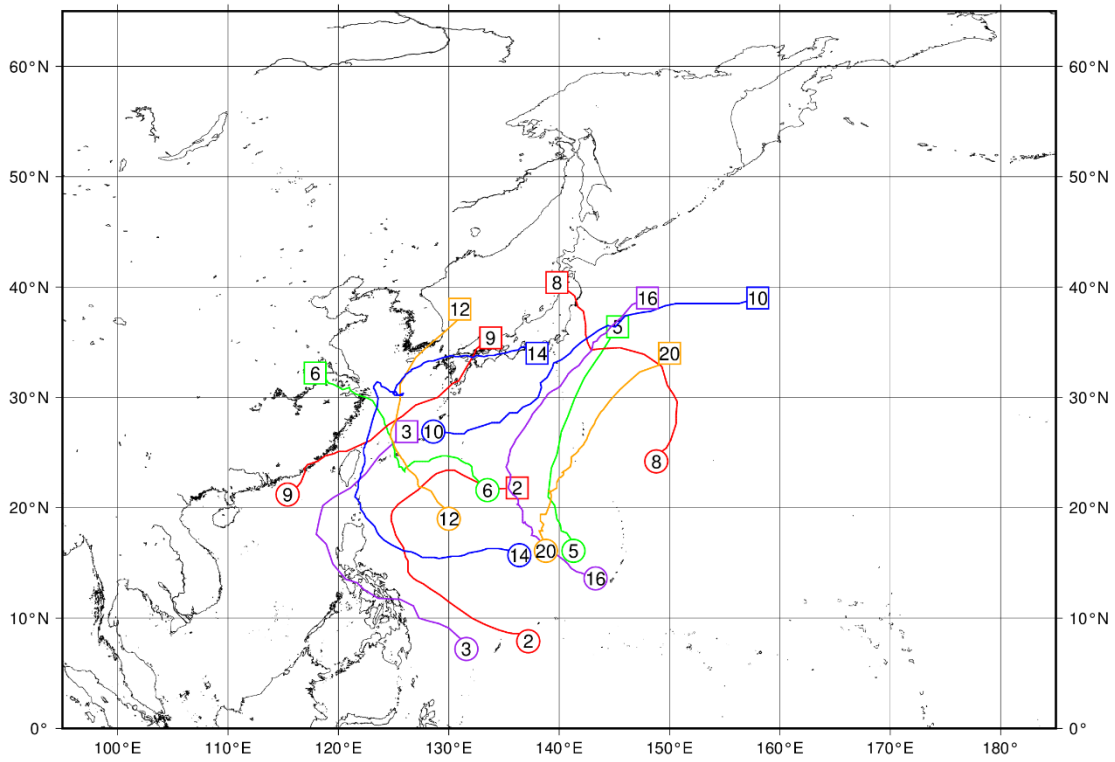


Figure 1 Tracks of the eleven named TCs affecting Japan in 2021
Circles: genesis points of named TCs (showing the last two digits of the TC ID number); squares: dissipation points

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

Japan experienced two major water-related disaster in 2021.

Eight typhoons approached Japan, and three of them landed in 2021. These typhoons have not caused any major water disasters. On the other hand, heavy rains occurred in July and August due to the effects of stagnant fronts.

1) July 2021 Heavy Rainfall

Heavy rain occurred due to the influence of the Baiu front, which stagnated for a long time from early to mid-July. This heavy rain caused enormous damage, including river flooding in 64 rivers in 31 water systems throughout Japan, mainly in the Tokai region and the southern part of the Kanto region. In Shizuoka prefecture in the Tokai region, 72-hour cumulative rainfall reached the top in the history of observation at multiple points, and became a factor in the occurrence of debris flow.

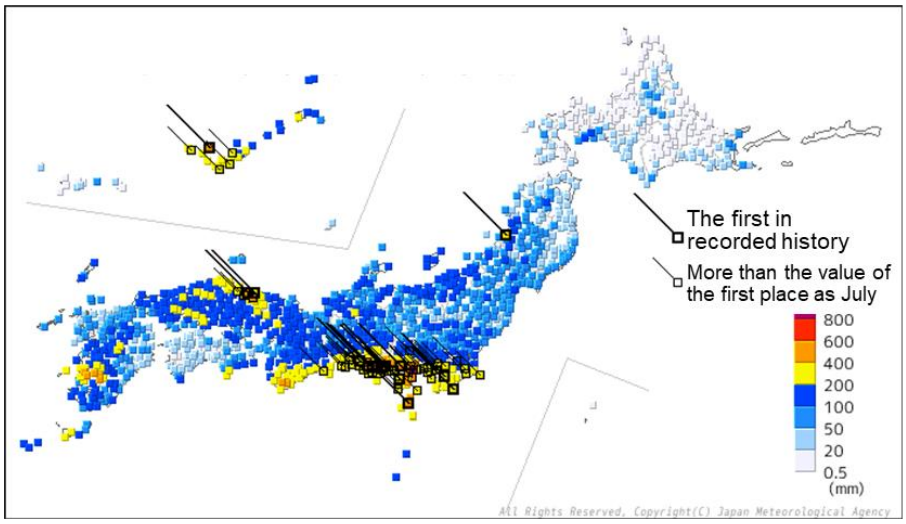


Figure 2 Maximum 72-hour rainfall for the period
(Period: June 30, 2021 ~ July 12, 2021)

Damage caused by Mudslides (Atami City, Shizuoka Pref.)

Slope collapse at Zushi Interchange (Zushi City, Kanagawa Pref.)

Damage to the Kise River Bridge (Numazu City, Shizuoka Pref.)

Inundation in Sendai River (Satsuma Town, Kagoshima Pref.)

Figure 3 Damage Condition

2) August 2021 Heavy Rainfall

A vigorous front that stagnated near Japan in August caused training rainstorms, with heavy rains continuing for a long time in the same place.

At many points in western Japan, the 72-hour cumulative rainfall was the highest in the history of yearly or monthly observation in August.

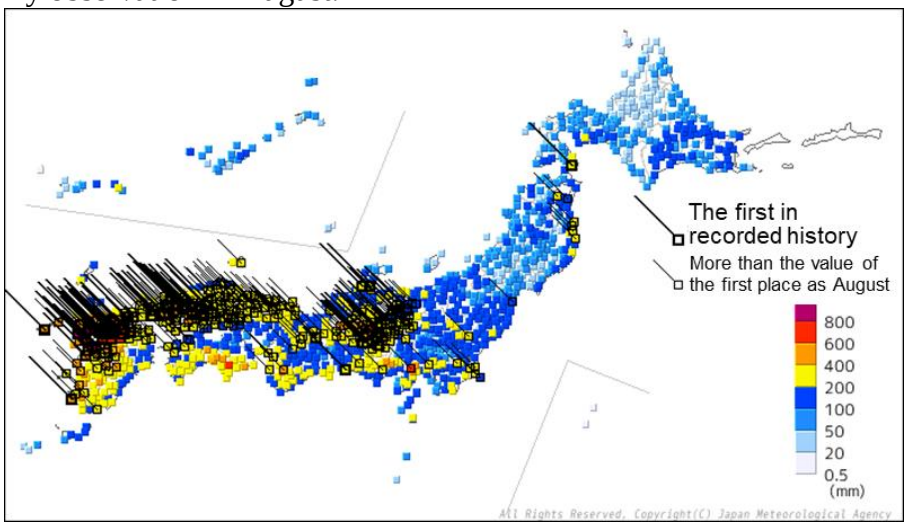


Figure 4 Maximum 72-hour rainfall for the period
(Period: August 11, 2021 ~ August 26, 2021)

Overflow
(Gounogawa River)

Levee Broken
(Tajihigawa River)

Overflow and Inflow
(Rokkakugawa River)

Takata, Nishi-ku, Hiroshima City,
Hiroshima Pref.

Figure 5 Damage Condition

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

Damage from major tropical cyclones in 2021

As of November 10, 20 tropical cyclones had formed in the Western North Pacific basin, with 11 approaching Japan and 3 making landfall.

Tropical Cyclone No. 9 (Lupit) made landfall on Makurazaki City in Kagoshima Prefecture just after 8 p.m. on August 8, then around Kure City in Hiroshima Prefecture just after 5 a.m. on August 9. It was classified as an extratropical cyclone at 9 a.m. on August 9.

Maximum wind speeds of 38.0 m/s in the Muroto City of Kochi Prefecture and 25.6 m/s in the Edogawa City of Tokyo were observed.

Total precipitation from August 4 to 10 at Hamada City in Shimane Prefecture was 368.0 mm. At many stations of northern and western Japan, 24-hour precipitation exceeded 200 mm.

The TC resulted in 2 fatalities as well as causing 40 injuries, 5 of which were serious. There were 2 instances of serious residential damage, 165 instances of lighter residential damage, 129 instances of flooding above floor level, and 306 instances of flooding below floor level (as of 5 p.m. on August 30).

The event also caused damage to electricity and water supply infrastructure, with Tohoku Electric Power experiencing outages in addition to 343 water supply outages in Aomori Prefecture as of 7 a.m. on August 19.

4. Regional Cooperation (highlighting regional cooperation and related activities)

1) HELP expert meeting on the occasion of the International Conference on Sustainable, Resilient Cities and Transport, Aichi 2021

Date: 20 (Wed.) October 2021
Location: Tokoname, Aichi Prefecture, Japan
Theme: Investment and Financing for Sustainable Development of Disaster Risk Reduction in the Post-Corona era

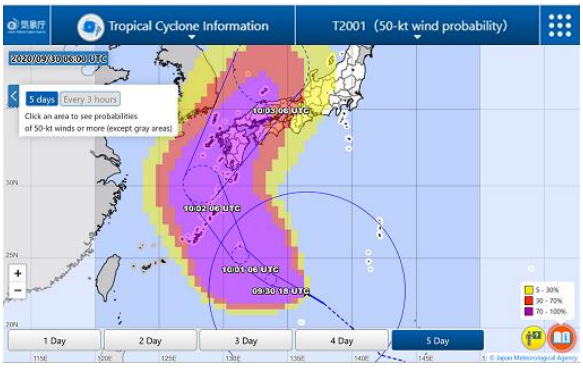
2) 4th Asia-Pacific Water Summit (postponed from October 2020)

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 50-kt wind probability maps and charts for TDs expected to reach TS intensity or higher within 24 hours

Main text:
On 29 June 2021, JMA began to provide these maps and time-series charts for tropical depressions (TDs) expected to reach tropical storm (TS) intensity or higher within 24 hours over the Japanese archipelago to support accelerated disaster prevention support.



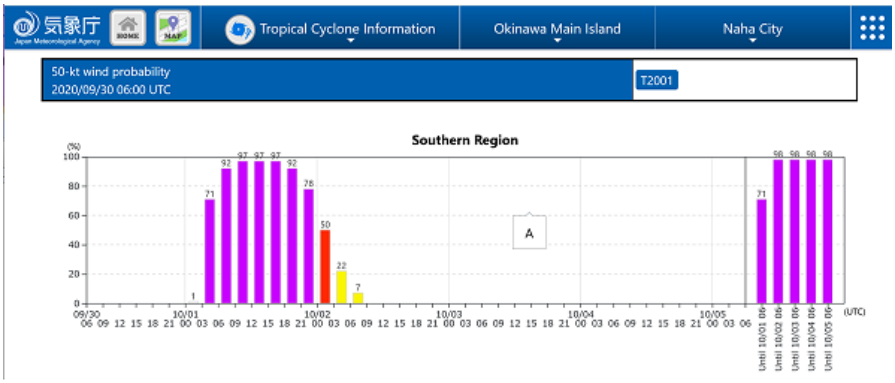


Figure 6 (Left) 50kt wind probabilities maps (Bottom) Time series chart for a certain location
[URL]https://www.jma.go.jp/bosai/map.html#5/34.507/137.021/&elem=typhoon_all&typhoon=all&contents=typhoon (Japanese)
https://www.jma.go.jp/bosai/map.html#3/30/140/&elem=root&typhoon=all&lang=en&contents=typhoon (English)

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

Priority Areas Addressed:
Integrated
- Enhance activities to develop impact-based forecasts and risk-based warning.

Meteorology
- 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.

Contact Information:
Member: Japan
Name of contact for this item: HOSOMI Takuya
Telephone: +81-3-6758-3900
Email: rsmc-tokyo@met.kishou.go.jp

2. Enhanced tropical cyclone verification

Main text:
The RSMC Tokyo – Typhoon Center conducts post-event analysis of tropical cyclones based on quality-assured observational data, publishing the results in its annual report. The 2020 report highlighted improvements including (i) timing of initial operational forecasts for named TCs, (ii) frequency distribution of 24- to 120-hour forecast position errors in the longitudinal/latitudinal and cross-track/along-track directions, and (iii) errors in track and intensity forecasts for named TCs, including periods when TDs are expected to reach TS intensity or higher within 24 hours.

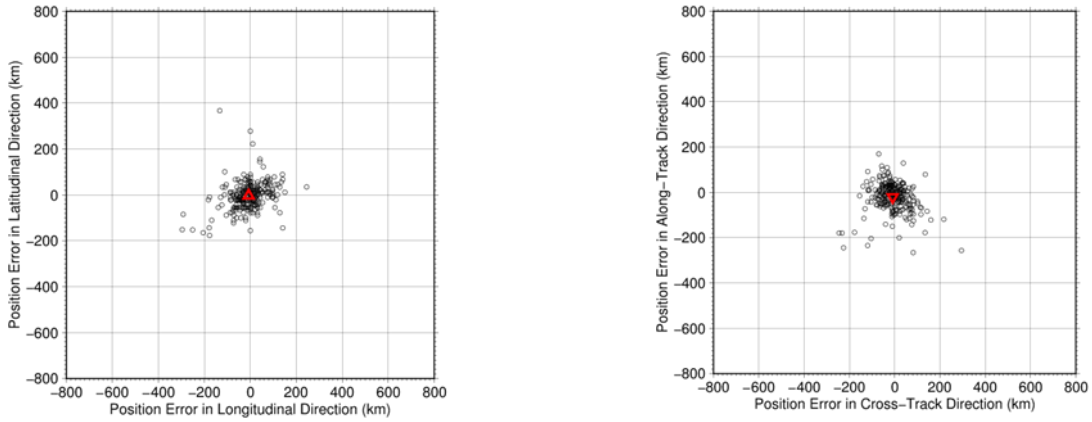


Figure 7 Scatter diagrams of 24-hour forecast position errors in the longitudinal/latitudinal (left) and cross-/along-track directions (right) for 2020
[URL] https://www.jma.go.jp/jma/jma-eng/jma-center/rsmc-hp-pub-eg/annualreport.html

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

Priority Areas Addressed:
Meteorology
- Enhance RSMC capacity to provide regional guidance including storm surge, responding to Member's needs.

Contact Information:
Member: Japan
Name of contact for this item: HOSOMI Takuya
Telephone: +81-3-6758-3900
Email: rsmc-tokyo@met.kishou.go.jp

3. Updates on JMA's numerical weather prediction system

Main text:

1. Operational use of GOES-16 Atmospheric Motion Vector (AMV) and ScatSat-1/OSCAT data in JMA's Global Numerical Weather Prediction (NWP) System

In July 2020, GOES-16 AMV and ScatSat-1/OSCAT data were adopted in data assimilation for JMA's global NWP system (Nonaka and Koyamatsu 2021).

2. Upgrade of JMA's Global NWP system

The Japan Meteorological Agency (JMA) upgraded its operational global Numerical Weather Prediction (NWP) system in March 2021 to incorporate the enhanced vertical resolution (100 to 128) of the JMA Global Spectral Model (GSM), improved land surface analysis and an upgraded atmospheric data assimilation system (Ujiie et al. 2021; Yokota et al. 2021). These improvements resulted in better forecasting, particularly for the Northern Hemisphere.

3. Upgrade of JMA's Global Ensemble Prediction System

JMA upgraded its Global Ensemble System (Global EPS) in March 2021 to incorporate the same model upgrades as in the GSM, an increased ensemble size (27 to 51) for forecasts with lead times up to 264, and improved initial perturbations (Yamaguchi et al. 2021). The increased number of ensemble members improved the capture rate in typhoon course prediction. As an example, track forecasts for Typhoon Faxai (September 2019) with the previous and upgraded GEPSs are shown in Figure 8 (a) and (b). The upgraded GEPS captured the best track from RSMC Tokyo analysis better than the previous GEPS with the increased number of members.

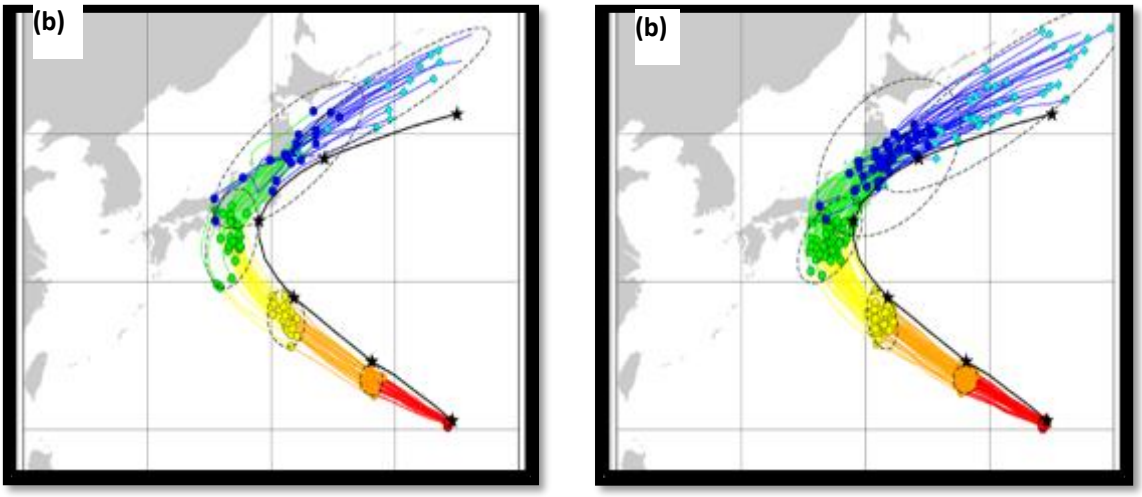


Figure 8 (a) Track forecasts for Typhoon Faxai (September 2019) from the previous GEPS Colored lines: GEPS-based track forecast; black line/stars: best track based on RSMC Tokyo analysis; (b) as per (a), but from the upgraded GEPS.

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Nonaka, K. and S Koyamatsu, 2021: Operational Use of GOES-16 Atmospheric Motion Vector (AMV) and ScatSat-1/OSCAT Data in JMA's Global NWP System. WGNE. Res. Activ. Earth Sys. Modell., 51. 1.09-1.10.

Ujiie, M., M. Higuchi, T. Kadowaki, Y. Kuroki, K. Miyaoka, M. Oda, K. Ochi, R. Sekiguchi, H. Shimizu, S. Yokota, and H. Yonehara, 2021: Upgrade of JMA's Operational Global NWP system. WGNE. Res. Activ. Earth Sys. Modell., 51. 6.09-6.10.

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

Priority Areas Addressed:
Meteorology

- 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.

Contact Information:
Member: Japan
Name of contact for this item: IKEGAMI Masaaki
Telephone: +81-3-3434-9102
Email: globalnwp@met.kishou.go.jp

4. TCC products and publications related to tropical cyclones

Main Text:

The Tokyo Climate Center (TCC) periodically issues reports on extreme climate events worldwide, including extremely heavy precipitation and/or weather-related disasters caused by 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 global atmospheric circulation phenomena. This instrumental resource is intended to support monitoring and clarification of changes in the likelihood of tropical cyclogenesis on intra-seasonal time scales, as the MJO is a substantial influence on the potential for tropical cyclogenesis over the western North Pacific.

The Center has developed new climatological normals using data for the period from 1991 to 2020, with operational application starting on 19 May 2021. A number of products, including the MJO-related diagrams detailed above, are based on the new normal data.

TCC also issues the quarterly TCC Newsletter delivering 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. 66 provides a summary of the 2021 Asian summer monsoon, with details of temperature/precipitation anomalies and overall monsoon/tropical cyclone activity.

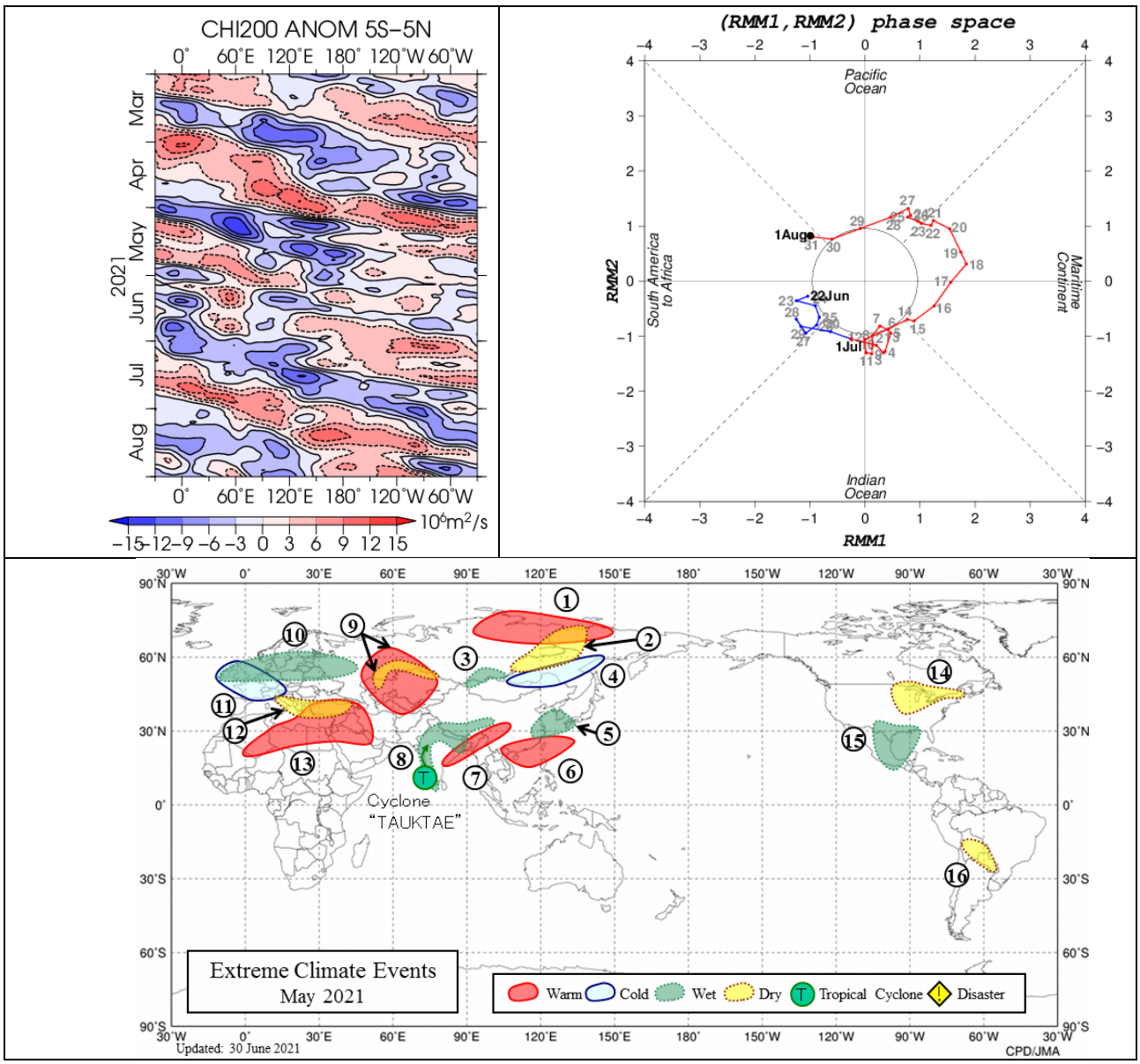

Figure 9 Top left: Hovmöller diagram depicting a time-longitude section of convective activity anomalies; top right: phase diagram indicating MJO amplitude and propagation; bottom: global extreme weather/climate events for May 2021 (based on the 1991 – 2020 normal period)

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

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Priority Areas Addressed

Integrated

- Enhance collaborative activities with other regional/international frameworks/organizations, including Typhoon Committee and Panel on Tropical Cyclone cooperation mechanism.

Meteorology

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

Contact Information:

Member: Japan
Name of contact for this item: KAKIHARA Koichiro and WAKAMATSU Shunya
Telephone: +81-3-6758-3900 (Ext. 4550, 4551)
Email: tcc@met.kishou.go.jp

5. Full operation of the TC communication platform

Main text:
The RSMC Tokyo – Typhoon Center's TC communication platform (developed and maintained by the Center since July 2019) supports enhanced communication between operational forecasters and the Center, as well as sharing of advance-notice updates. As of 2 November 2021, approximately 15 inquiries relating to seven tropical cyclones had been submitted via the platform, with related discussions helping to clarify TC status and forecasts.

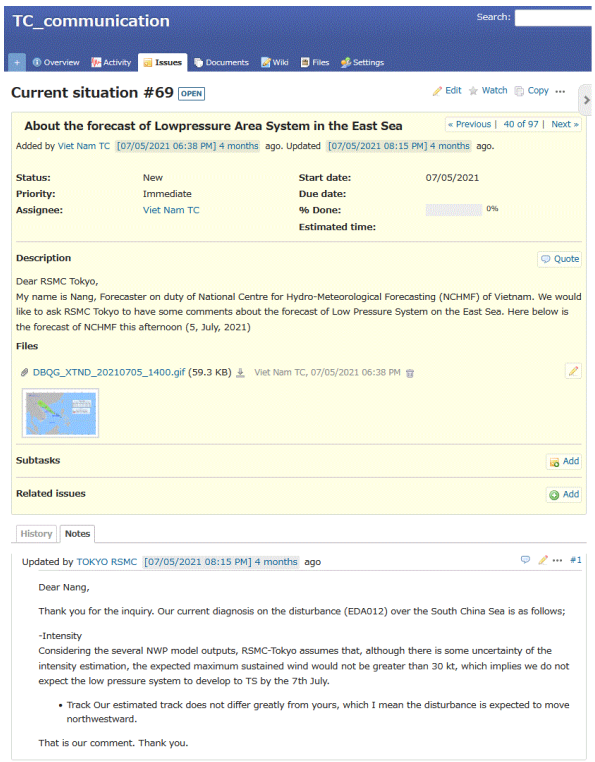

Figure 10

Identified opportunities/challenges, if any, for further development or collaboration:
Ongoing focus will be placed on improving effective communication between operational forecasters and RSMC-Tokyo.

Priority Areas Addressed:
<u>Meteorology</u>

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

Contact Information:
Member: Japan
Name of contact for this item: HOSOMI Takuya
Telephone: +81-3-6758-3900
Email: rsmc-tokyo@met.kishou.go.jp

6. Attachment training in 2021

Main text:
The 20th ESCAP/WMO Typhoon Committee Attachment Training course was held from 9 to 11 March 2021. The RSMC Tokyo – Typhoon Center has run these courses annually since 2001 with the support of the WMO Tropical Cyclone Programme and the Typhoon Committee to enhance the tropical cyclone (TC) analysis and forecasting capacity of Committee Members. Amid the COVID-19 pandemic, the course was held virtually with 44 attendees from seven Typhoon Committee Members (Hong Kong China, Macao China, Malaysia, the Philippines, the Republic of Korea, Singapore and Thailand). RSMC New Delhi senior forecaster Sunitha Devi attended as an invited presenter, and two researchers from the Japan Meteorological Agency (JMA) Meteorological Research Institute attended the presentation session.

Figure 11 Attendees and Tokyo Typhoon Center staff (11 March, 2021)

Identified opportunities/challenges, if any, for further development or collaboration:
Ongoing focus will be placed on enhancing training course quality.

Priority Areas Addressed:
<u>Integrated</u>
- Enhance collaborative activities with other regional/international frameworks/organizations, including TC and PTC cooperation mechanism.

<u>Meteorology</u>
- 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.
- Enhance and provide typhoon forecast guidance based on NWP including ensembles and weather radar related products, such as QPE/QPF.
- Enhance, in cooperation with TRCG, training activities in accordance with Typhoon Committee forecast competency, knowledge sharing, and exchange of latest development and new techniques.

Contact Information:
Member: Japan
Name of contact for this item: HOSOMI Takuya
Telephone: +81-3-6758-3900
Email: rsmc-tokyo@met.kishou.go.jp

7. Contribution to the ICHARM International Flood Initiative (IFI) e-learning workshop

Main text:
JMA and the International Centre for Water Hazard and Risk Management (ICHARM) collaborate to share cumulative JMA expertise with other Asian countries on the IFI platform established via collaboration among various international and national governmental organizations. In 2021, JMA contributed to IFI e-learning workshops for the Philippines in April and for Indonesia in October. Experts from various disciplines and public-sector operators (e.g., government bodies, public organizations and media) were hosted at the Effective Hazard Information and Public Awareness presentation on JMA's latest disaster risk reduction efforts.

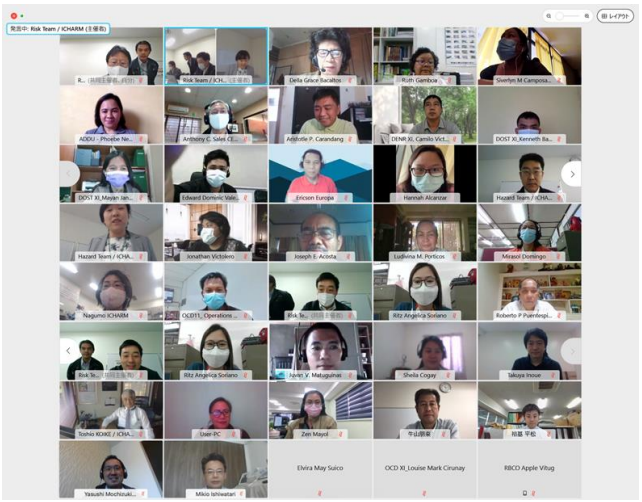

Figure 12 Davao workshop attendees (courtesy of ICHARM)

Identified opportunities/challenges, if any, for further development or collaboration:
Ongoing focus will be placed on effective contribution to the IFI platform.

Priority Areas Addressed:
Integrated
- Enhance activities to develop impact-based forecasts and risk-based warning.
- Strengthen cross-cutting activities among working groups in the Committee.

Meteorology
- Strengthen the cooperation with WGH and WGDRR to develop impact-based forecast and risk-based warning.

Hydrology
- Enhance capacity in flood risk (hazard, inundation) information, mapping and its application

Contact Information:
Member: Japan
Name of contact for this item: HOSOMI Takuya
Telephone: +81-3-6758-3900
Email: rsmc-tokyo@met.kishou.go.jp

8. 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 "basin hydraulic control", named as “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.

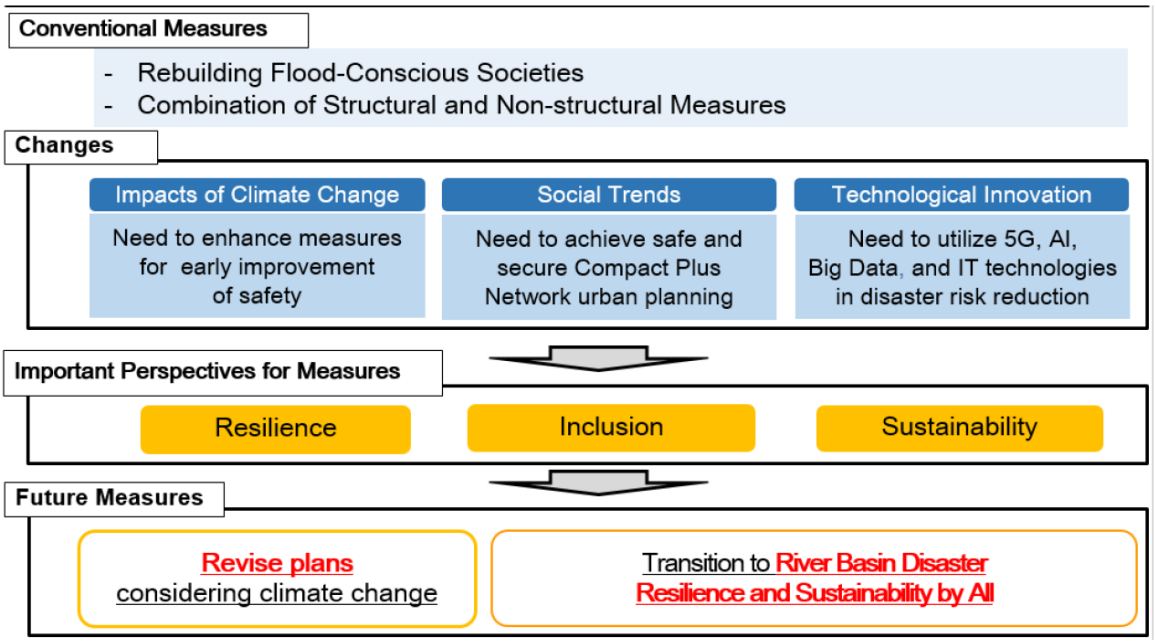

Figure 13 Overview of River Basin Disaster Resilience and Sustainability by All

MLIT is promoting following measures to implement the new flood managementpolicy, River Basin Disaster Resilience and Sustainability by All:

1) Flood Protection - Enhancement of flood prevention measures
2) Exposure Reduction - Measures to reduce a damage target
3) Disaster Resilience -

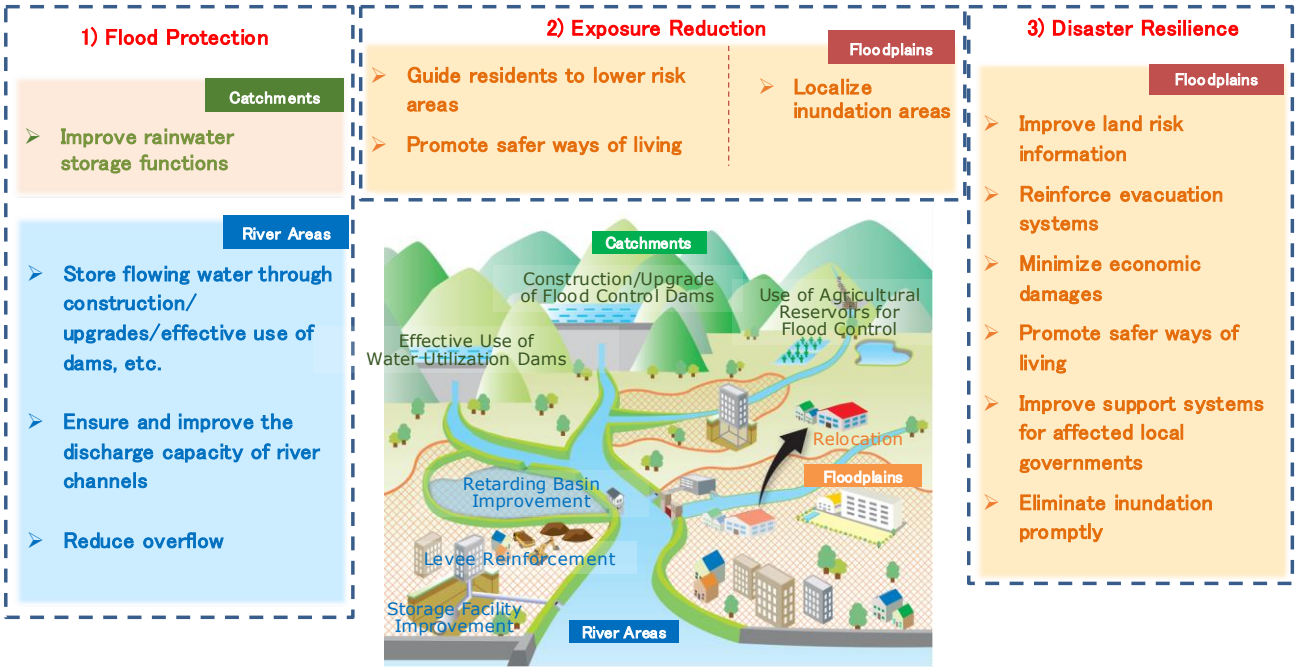

Figure 14 Image of the new policy, "River Basin Disaster Resilience and Sustainability by all"

The "Law to partially revise Specified Urban River Inundation Control Law" was enacted in the Diet in April 2021 and promulgated in May 2021, in order to enhance the effectiveness of "basin hydraulic control" and promote strongly.
This law amendment is an integrated revision of nine laws, including the River Law, Sewerage Law, Flood Control Law, City Planning Law, Urban Green Space Law, and Building Standards Law, in addition to Specified Urban River Inundation Control Law.
Specifically, a legal framework was established to enhance the effectiveness of "basin hydraulic control" for the following four items.

(1) Strengthening of plans and systems for "basin hydraulic control"

- Expand rivers that utilize the "basin hydraulic control" plan
- Establishment of a council on basin flood control and enhancement of "basin hydraulic control" plan

(2) Measures to prevent flooding as much as possible

- Establishment of a council for pre-discharge of water utilization dams and power generation dams
- Set target rainfall to prevent flood damage in the sewerage plan and accelerate flood control measures in the sewerage system.
- Mandatory formulation of operating rules for sewer drainage gutters
- Establishment of a system to secure land with water retention and retarding basins along the river
- Conservation of urban green spaces with rainwater storage and infiltration functions
- Support for the development of local and private rainwater storage and infiltration facilities through certification systems and subsidies

  etc

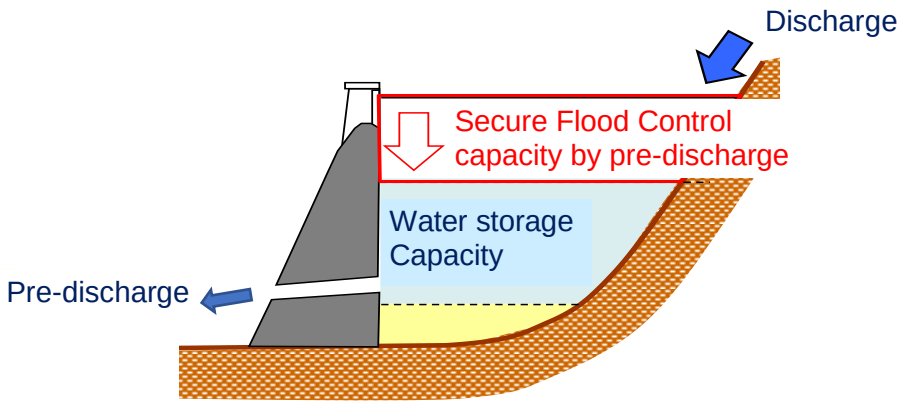

Figure 15 Image of pre-discharge of dam to secure flood control capacity

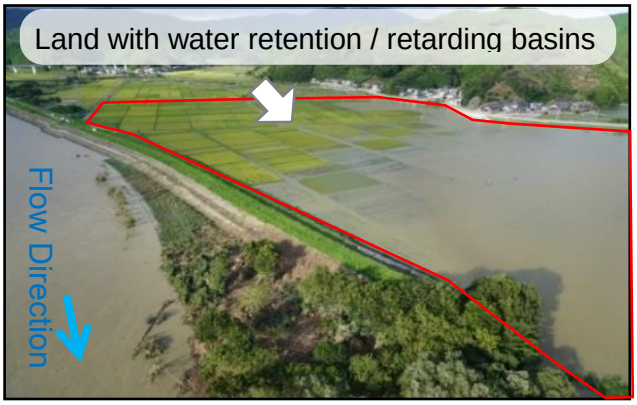

Figure 16 Image of secure land with water retention and retarding basins along the river

(3) Measures to reduce the damage targets

- Establishment of a system to confirm the safety of flood damage in advance, such as housing and facilities for people requiring special consideration
- Expansion of area requirements for disaster prevention group relocation promotion projects
- Promotion of development of evacuation bases in the event of a disaster
- Promotion of flood control measures for each district

etc

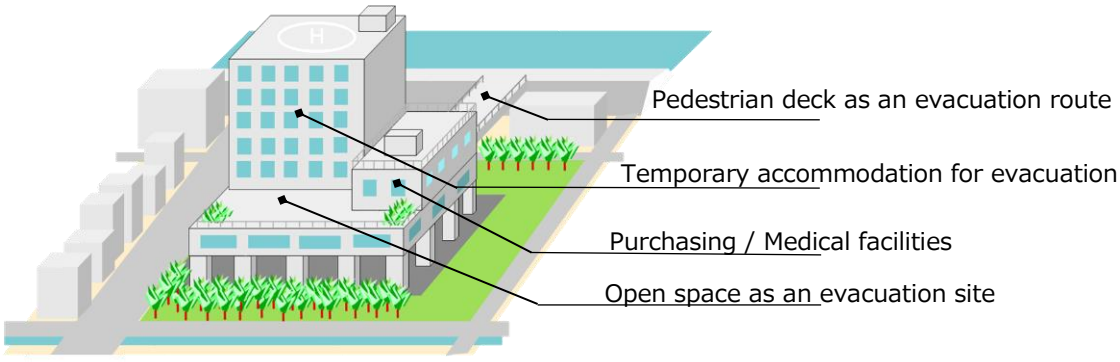

Figure 17 Image of development of evacuation base

(4) Measures for damage reduction, early recovery, and reconstruction

- Expand the target rivers for creating flood hazard maps to small and medium-sized rivers
- Establishment of a municipal advice / recommendation system for evacuation plans for facilities for people requiring special attention

- Expansion of target rivers that the Minister of MLIT will act as an authority in the event of a disaster
  etc

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:
Integrated
- Strengthen cross-cutting activities among working groups in the committee

Hydrology
- Enhance capacity in typhoon-related flood risk management (including dam operation), integrated water resources management and flood-water utilization

Contact information:
Member: Japan
Name of contact for this item: NAKASHIMA Yasuhiro
Telephone: +81-3-5253-8444
Email: hqt-kawakeikokusai@gxb.mlit.go.jp

9. Organization of the 10th TC WGH Meeting (online), 22 October 2021

Main Text:
The 10th Meeting of the Typhoon Committee Working Group on Hydrology (WGH) was hosted online on October 22 2021 by Japan's Ministry of Land, Infrastructure, Transport and Tourism and chaired by Dr. Miyamoto from ICHARM (the International Centre for Water Hazard and Risk Management). This conference had been held as a venue event, but it has been forced to be held online since the 9th time last year due to the spread of Covid-19 infection in early 2020.
The meeting went ahead with 46 attendees from 12 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.

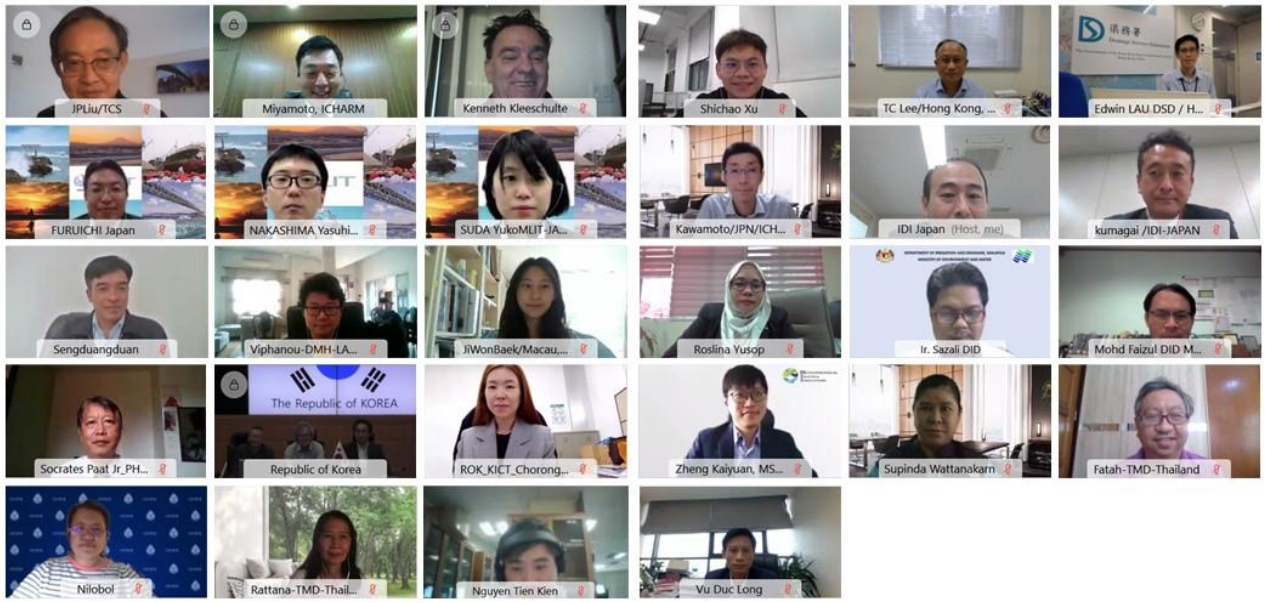

Figure 18 10th WGH Meeting group photo

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

Contact information:
Member: Japan
Name of contact for this item: SUDA Yuko
Telephone: +81-3-5253-8444
Email: hqt-kawakeikokusai@gxb.mlit.go.jp

10. ADRC Online DRR Seminar Series

Main Text:
Despite continued efforts by the many countries to implement the Sendai Framework for Disaster Risk Reduction (SFDRR), the damage caused by disasters has increased in recent years due to the global climate crisis and the increasing vulnerability of cities. In order to not only save human lives but also to ensure sustainable development of countries and regions, it is necessary to build a disaster resilient society through various systems and technologies. Asian Disaster Reduction Center (ADRC) organized a series of Online DRR Seminars to build up the discussions on the following three themes toward its annual conference, Asian Conference on Disaster Reduction (ACDR) 2021 to be held on 14-16 December 2021.
1) Building resilient societies to the intensifying climate crisis and increasing urban vulnerability
2) Strengthening preparedness for disasters (disaster education, promotion of disaster volunteer activities, etc.), and
3) DRR technology that match local needs to create safe, secure and livable society.

First Seminar (15 June 2021)
Theme: Building Societies Resilient to the Intensifying Climate Crisis and Increasing Urban Vulnerability―Investing in Disaster Risk Reduction for a Resilient Society
The seminar adopted the theme of Investing in Disaster Risk for a Resilient Society and three speakers shared various perspectives with more than 300 participants from 20 countries.

Second Seminar (13 July 2021)
Theme: Strengthening Preparedness against Disaster―DRR Education and Awareness Raising through Passing Down of Lessons from Past Disasters
The seminar, attended by 281 people from all over the world, showcased current efforts and challenges in promoting DRR education and awareness raising by utilizing past disaster experiences effectively in order to pass them on to the next generation.

Third Seminar (14 September 2021)
Theme: Disaster Technologies that Meet Local Needs to Build a Safe, Secure and Lively Society―Case Studies on Utilization of Standardization for Structural and Non-structural DRR Measures
It was attended by 116 people from all over the world, highlighted case studies of DRR investments made before disasters and other activities conducted in line with international standards.

Fourth Seminar (28 September 2021)
Building Societies Resilient to the Intensifying Climate Crisis and Increasing Urban Vulnerability―Impact of GLOF on the local economy and the measures to be taken
ADRC invited two experts from the International Centre for Integrated Mountain Development (ICIMOD) to share their knowledge, experience, and information on Glacial Lake Outburst Floods (GLOF) programs to the 88 participants of the Fourth seminar.

Fifth Seminar (13 October 2021)
Building Societies Resilient to the Intensifying Climate Crisis and Increasing Urban Vulnerability―Promotion of Disaster Mitigation Strategies to Construct Disaster Resilient Cities
At the Fifth seminar, speakers presented various perspectives, tools, and approaches of promoting disaster mitigation strategies for urban resilience to 127 participants from 14 countries.

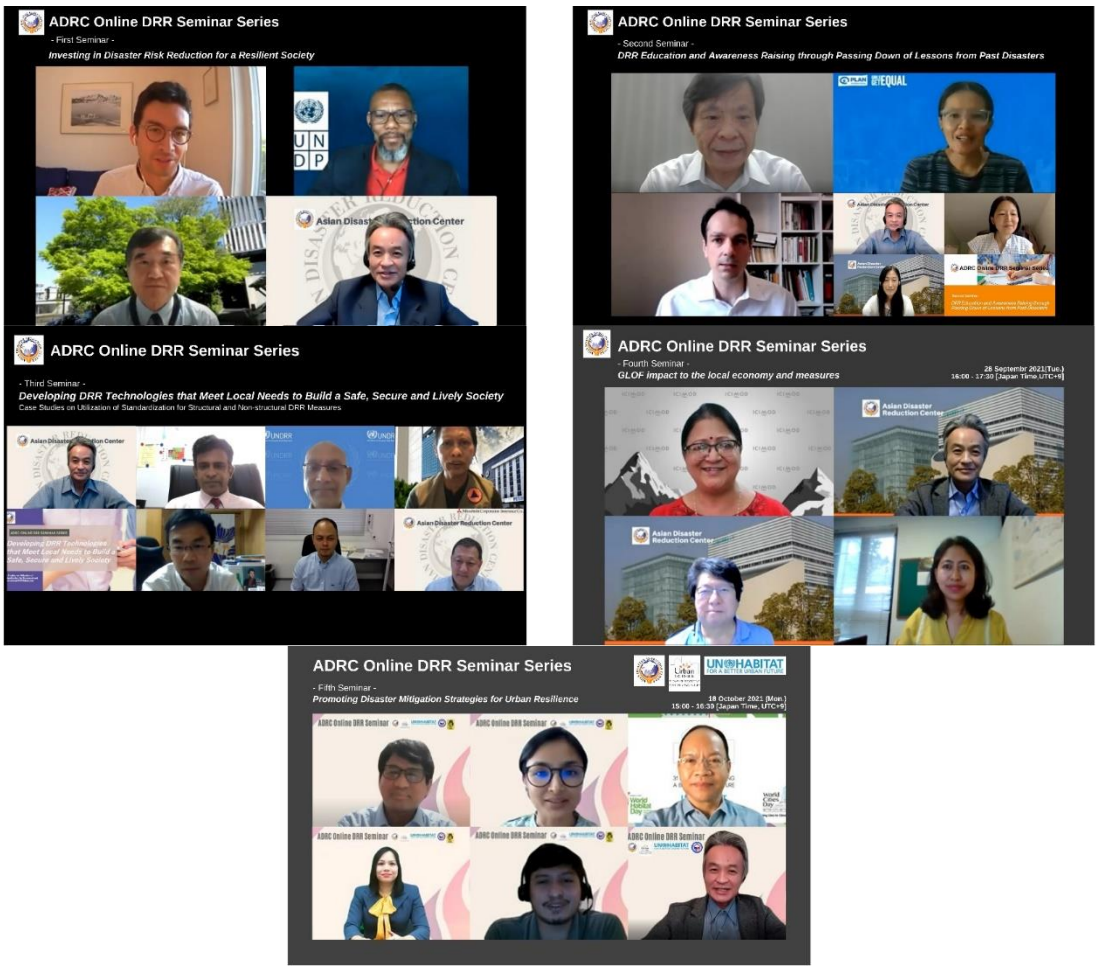

Figure 19 Seminar photos (Top left: first seminar, bottom: fifth seminar)

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

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Priority Areas Addressed:

Integrated

- Enhance collaborative actives with other regional / international frameworks/organizations, including TC and PTC cooperation mechanism.

DRR

- Share experience/know-how of DRR activities including legal and policy framework, community-based DRR activities, methodology to collect disaster-related information.

Contact information:

Member: Japan
Name of contact for this item: NAKAGAWA Masaaki
Telephone: +81-78-262-5540
Email: mn-nakagawa@adrc.asia