

**WORKING GROUP ON METEOROLOGY ACTIVITIES
ANNUAL REPORT 2021**

(Submitted by WGM Chair)

ACTION REQUIRED:

The Committee is invited to:

- a) Take note of the Members activities and major progress and issues in meteorology component in 2021 as reported by Members at the 16th IWS.
- b) Review the activities of WGM conducted in 2021.
- c) Approve the recommendations and planned activities of WGM for 2022 and beyond.

APPENDICES:

- A. DRAFT TEXT FOR INCLUSION AT SESSION REPORT
- B. Report on activities of Working Group on Meteorology (WGM) in 2021
- C. Summary Report of WGM Parallel Meeting at the 16th IWS

APPENDIX A

DRAFT TEXT FOR INCLUSION IN THE SESSION REPORT

8.1 Meteorological Component

1. The Committee took note of the Member's activities and major progress and issues in Meteorological Component in 2021 as reported by Members at the 16th IWS.
2. The Committee reviewed the activities of Members in implementing the TC Strategic Plan and its annual operating plan in relation to Meteorological Component during past year, details of which are presented in **Appendix X**.
3. The Committee took note of the outcomes of the WGM Parallel Session at the 16th IWS on 2-3 December 2021. With the assistances of TCP/WMO and TCS and the strong support from all Members, WGM has successfully completed the tasks in 2021 with significant outcomes as follows:
 - a. WGM has fulfilled all the action plans (5 POPs, 9 AOPs and 2 PPs) in 2021, which were endorsed at the 53rd TC Session.
 - b. Since the outbreak of COVID-19 in early 2020, the impacts of the COVID-19 pandemic have been deep and wide. Some activities in WGM such as research fellowships, technical transfer and meetings have been either cancelled or postponed due to global travel restrictions and border closure as well as strict social distancing measures in many countries/places.
 - c. After the 53rd TC Session in 2021, WGM has been carrying out the following activities that involve the cooperation among Members as well as other TC WGs and international organizations:
 - i. Coordinated with the Shanghai Typhoon Institute (STI) to organize the fourth WGM Annual Meeting by video conferencing on 28 October 2021.
 - ii. Coordinated with China Meteorological Administration (CMA) for the online International Training Course "Sixth International Distance Training Course on Tropical Cyclone Monitoring and Forecasting" to be held from 25 November to 3 December 2021.
 - iii. Coordinated with TRCG to host the 2021 research fellowship by the Hong Kong Observatory (HKO) on a topic entitled "Verification of tropical cyclone wind structure forecasts from global NWP models and ensemble prediction system" via a remote approach.

Conclusions of WGM

In the basis of the information provided by Members and the respective coordinator of the actions plan and based on the discussion during the 16th IWS, the following conclusions were reached:

- a. Members have made important progress in the implementation of the TC Strategic Plan during the year 2021.
- b. Members made significant progress during 2021 in tropical cyclone monitoring and communication systems, data assimilation and numerical weather prediction systems, tropical cyclone forecast-aiding systems, and scientific understanding of tropical cyclone activities.
- c. With the help of Tropical Cyclone Programme (TCP) of WMO and Typhoon Committee Secretariat (TCS), and the absolute sincere cooperation of all Members and the effective efforts of the WGM focal points, WGM has successfully completed the tasks in 2021.
- d. The 4th WGM Annual Meeting was held online on 28 October 2021. Major results of the meeting were reported during the WGM parallel session in the 16th IWS.
- e. Based on the discussion on the operating plans for 2021 during the 16th IWS, it was concluded to adopt the operating plans as follows:
 - i. The POP item 1-3 will be continued in 2022.
 - ii. The POP item 4 will be closed.
 - iii. The POP item 5 will be renamed as item 4 and continued in 2022.
 - iv. The AOP item 1-9 will be continued in 2022.
 - v. The PP item 1-2 will be continued in 2022.
- f. The total budget proposed by WGM, which was concurred at the AWG meeting during the 16th IWS, for undertaking the operating plans (AOPs, POPs and PPs) in 2021 is US\$38,000. In addition, the budget of US\$12,000 will be allocated for the cross-cutting project (PP1) between WGM and TRCG.
- g. The complete WGM 2022 operating plans (AOPs, POPs and PPs) including the actions, the success indicators, coordinators and budget is listed in [Appendix X](#).

Recommendations of WGM

- a. To request KMA to improve typhoon summer prediction techniques and provide information via e-mail for Member countries in late May.
- b. To request CMA to encourage TC Members to join the Collaborative Discussion (CoDi) Forum for real-time typhoon discussion and information exchange.
- c. To request STI to publish the TCRR Journal on a quarterly basis in 2022, and to improve the editorial procedure and Journal's influence.
- d. To request STI to issue summary report on verification of TC forecast products in 2021 typhoon season in western North Pacific, and plan to issue the verification

- results for other basins.
- e. To request STI to strengthen international cooperation and promote the exchange of TC data and verification techniques through WMO-TLFTP.
 - f. To request JMA to further develop tropical cyclone genesis guidance using early Dvorak Analysis (EDA) and global ensemble.
 - g. To request CMA to improve the performances and impacts of TRAMS including the dynamic core, physical processes and model products.
 - h. To request JMA to further refine quality control techniques applied to the participants' radar networks to improve their quality of radar composites, and to implement and refine Malaysian Meteorological Department (Met Malaysia) and Thailand Meteorological Department (TMD)'s QPE calibration using rain-gauge.
 - i. To request JMA to support applicants to join the experimental regional radar data exchange in the future, and to share the progress with RA II/V WIGOS radar project in Southeast Asia.
 - j. To request JMA to compose a user's guide among JMA, Met Malaysia and TMD.
 - k. To request JMA to hold follow-up technical meeting(s) upon receipt of progress reports on the project **Development of Regional Radar Network (AOP3)** from participants.
 - l. To request Met Malaysia and HKO to conduct training attachment for two participants from two TC Member countries on Radar Integrated Nowcasting System (RaINS) in 2022.
 - m. To request JMA to add storm surge time series prediction upon request from Members, and to publish verification results of storm surge predictions.
 - n. To request JMA to encourage Members to provide complete hourly sea level data of at least one year to provide accurate astronomical tides at the stations.
 - o. To request JMA to encourage Members to provide sea level observations during storm surge events for verification of storm surge predictions.
 - p. To request JMA to upgrade the storm surge watch scheme model and renew SSWS products on the NTP website.
 - q. To request CMA implement the field campaign collaboration among participating Members by using aircraft, Unmanned Surface Vessel (UAS), airship, rocket, high-resolution radar, etc.
 - r. To request CMA and HKO to collect and share the field observation and research data, and to conduct demonstration research on tropical cyclone intensity change in conjunction with WMO-TLFDP.
 - s. To request JMA to improve Rapidly Developing Cumulus Area (RDCA) algorithm through the joint development by JMA and Met Malaysia.
 - t. To request JMA to provide supports for development of RDCA by Meteorological Service Singapore (MSS), TMD and Viet Nam Meteorological and Hydrological Administration (VNMHA).

- u. To request JMA to hold follow-up meeting(s) upon receipt of progress reports on the project **Enhancing Utilization of Himawari 8/9 Products (AOP7)** from participants.
- v. To request CMA to hold a special seminar on Parallel Analysis of Satellite Data in the Northwest Pacific and invite other agencies to participate.
- w. To request JMA to support AOP7 of WGH through providing 1-month and 3-month ensemble NWP model data, necessary for the project and available, to ICHARM, and to request JMA to share the knowledge such as characteristics and features related to NWP.
- x. To request JMA to continue sharing knowledge and experience on awareness raising through lectures for online workshops and meetings of IFI project.
- y. To request JMA to promote awareness with hydrological authorities to both local governments and public, including the appropriate use of products.
- z. To request Met Malaysia in cooperation with WGM and TRCG to organize a training workshop for younger operational forecasts on the new typhoon forecasting techniques, and to review the progress of WGM projects.
- aa. To request KMA to introduce GK2A upper-level products related to typhoon forecast and share the technique using GK2A data.
- bb. To endorse the proposed action plans in 2022 (including 4 POPs, 9 AOPs and 2 PPs) as listed in **Annex II of Appendix C – Summary Report for the WGM Parallel Meeting at the 16th IWS**, which summarizes the above recommendations with additional action items.
- cc. To endorse the WGM budget request included in the budget proposal to be submitted by AWG for TC's approval.
- dd. To appoint Mr. Hosomi Takuya as the rapporteur of TOM.
- ee. To encourage project coordinators of all working groups to submit the outcome (research paper) to the TCRR journal.

Appendix B

Report on activities of Working Group on Meteorology (WGM) in 2021

2021 ANNUAL REPORT OF WGM

(Submitted by Chair of WGM)

1. Introduction

1.1 According to the terms of reference, Working Group on Meteorology (WGM) is to promote cooperation among the Members of Typhoon Committee (TC) in the implementation of activities under the Meteorological Component of the Committee's Strategic Plan with the aim to support the socio-economic development process and enhance cooperation among the Members in all the three components. (Training and Research are incorporated as part of these three components.) Towards this end, the WGM is expected to advise and assist the Committee in:

- (a) Identifying priority issues and areas of cooperation in the Meteorological Component;
- (b) Promoting and facilitating the exchange of experiences and knowledge on latest developments and techniques related to the above issues and areas;
- (c) Coordinating and implementing priority activities and programmes of the Committee aiming at strengthening capacity of the Members in meteorology;
- (d) Mobilizing resources to carry out priority activities of the Committee related to the meteorological Component;
- (e) Reporting overall progress in the implementation of the meteorology component of the Strategic Plan;
- (f) Recommending to the Committee priority areas, programmes and activities for cooperation in meteorological research by related experts of the Members.

2. Membership

2.1 After the 53rd TC Session, the composition and focal point members list of WGM are:

Chair	Dr. Tang Jie (China)
Vice Chair	Dr. Vicente B. Malano (Philippines) Mr. Muhammed Helmi Abdullah (Malaysia)
Members	Ms. Phalla Peou (Cambodia) Mr. Ryu Ki Ryol (DPR Korea) Mr. K. K. Hon (Hong Kong, China) Mr. Hosomi Takuya (Japan) Mr. Bounteum Sysopanthavong (Lao PDR) Mr. Lok Chan Wa (Macao, China) Mr. Jun Galang (Philippines) Ms. Won Seonghee (Rep. of Korea) Mr. Lesley Choo (Singapore) Dr. Wattana Kanbua (Thailand) Mr. Christopher Brenchley (USA) Dr. Hoang Phuc Lam (Viet Nam)
Secretary of Mete.	Mr. Clarence Fong

2.2 Experts from other working groups of TC, TCP/WMO, WWRP/WMO, TCS, RSMC-Tokyo, etc. have also provided assistances to accomplish the tasks of WGM over 2021, endorsed at the 53rd session of TC. However, the outbreak of COVID-19 in early 2020 caused deep and wide impacts over the world and some activities in WGM such as research fellowships, technical transfer and meetings have been either cancelled or postponed due to global travel restrictions and border closure as well as strict social distancing measures in many countries/places.

3. The progress of WGM's plans in 2021

With the assistances of TCP/WMO and TCS and the strong support from all Members, WGM has successfully completed the action plans (5 POPs, 9 AOPs and 2 PPs) in 2021, which were endorsed at the 53rd Session. The WGM activities and the progress of all action items in 2021 are reported in the **Appendix C – Summary Report of the WGM Parallel Meeting at the 16th IWS**. The complete table of the 2021 action plans and its implementation status are listed in **Annex I** of the Summary Report.

After the 53rd TC Session in 2021, WGM has been carrying out the following activities that involve the cooperation among Members as well as other TC WGs and international organizations:

- i. Coordinated with the Shanghai Typhoon Institute (STI) to organize the fourth WGM Annual Meeting by video conferencing on 28 October 2021.

- ii. Coordinated with China Meteorological Administration (CMA) for the online International Training Course “Sixth International Distance Training Course on Tropical Cyclone Monitoring and Forecasting” to be held from 25 November to 3 December 2021.
- iii. Coordinated with TRCG to host the 2021 research fellowship by the Hong Kong Observatory (HKO) on a topic entitled “Verification of tropical cyclone wind structure forecasts from global NWP models and ensemble prediction system” via a remote approach.

4. Conclusions

In the basis of the information provided by Members and the respective coordinator of the actions plan and based on the discussion during the 16th IWS, the following conclusions were reached:

- a. Members have made important progress in the implementation of the TC Strategic Plan during the year 2021.
- b. Members made significant progress during 2021 in tropical cyclone monitoring and communication systems, data assimilation and numerical weather prediction systems, tropical cyclone forecast-aiding systems, and scientific understanding of tropical cyclone activities.
- c. With the help of Tropical Cyclone Programme (TCP) of WMO and Typhoon Committee Secretariat (TCS), and the absolute sincere cooperation of all Members and the effective efforts of the WGM focal points, WGM has successfully completed the tasks in 2021.
- d. The 4th WGM Annual Meeting was held online on 28 October 2021 (**Annex III of Appendix C**). Major results of the meeting were reported during the WGM parallel session in the 16th IWS.
- e. Based on the discussion on the operating plans for 2021 during the 16th IWS, it was concluded to adopt the operating plans as follows:
 - i. The POP item 1-3 will be continued in 2022.
 - ii. The POP item 4 will be closed.
 - iii. The POP item 5 will be renamed as item 4 and continued in 2022.
 - iv. The AOP item 1-9 will be continued in 2022.
 - v. The PP item 1-2 will be continued in 2022.
- f. The total budget proposed by WGM, which was concurred at the AWG meeting during the 16th IWS, for undertaking the operating plans (AOPs, POPs and PPs) in 2022 is US\$38,000. In addition, the budget of US\$12,000 will be allocated for the cross-cutting project (PP1) between WGM and TRCG.
- g. The complete WGM 2022 operating plans (AOPs, POPs and PPs) including the actions, the success indicators, coordinators and budget is listed in [Annex II of Appendix C](#).

5. Recommendations

- a. To request KMA to improve typhoon summer prediction techniques and provide information via e-mail for Member countries in late May.
- b. To request CMA to encourage TC Members to join the Collaborative Discussion (CoDi) Forum for real-time typhoon discussion and information exchange.
- c. To request STI to publish the TCRR Journal on a quarterly basis in 2022, and to improve the editorial procedure and Journal's influence.
- d. To request STI to issue summary report on verification of TC forecast products in 2021 typhoon season in western North Pacific, and plan to issue the verification results for other basins.
- e. To request STI to strengthen international cooperation and promote the exchange of TC data and verification techniques through WMO-TLFTP.
- f. To request JMA to further develop tropical cyclone genesis guidance using early Dvorak Analysis (EDA) and global ensemble.
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during storm surge events for verification of storm surge predictions.

- p. To request JMA to upgrade the storm surge watch scheme model and renew SSWS products on the NTP website.
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- v. To request CMA to hold a special seminar on Parallel Analysis of Satellite Data in the Northwest Pacific and invite other agencies to participate.
- w. To request JMA to support AOP7 of WGH through providing 1-month and 3-month ensemble NWP model data, necessary for the project and available, to ICHARM, and to request JMA to share the knowledge such as characteristics and features related to NWP.
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- aa. To request KMA to introduce GK2A upper-level products related to typhoon forecast and share the technique using GK2A data.
- bb. To endorse the proposed action plans in 2022 (including 4 POPs, 9 AOPs and 2 PPs) as listed in **Annex II of Appendix C – Summary Report for the WGM Parallel Meeting at the 16th IWS**, which summarizes the above recommendations with additional action items.
- cc. To endorse the WGM budget request included in the budget proposal to be submitted by AWG for TC's approval.

- dd. To appoint Mr. Hosomi Takuya as the rapporteur of TOM.
- ee. To encourage project coordinators of all working groups to submit the outcome (research paper) to the TCRR journal.

Appendix C

Summary Report of WGM Parallel Meeting at the 16th IWS

ESCAP/WMO Typhoon Committee
16th Integrated Workshop
2-3 December 2021
Video Conference

FOR PARTICIPANTS ONLY
26 November 2021
ENGLISH ONLY

WORKING GROUP ON METEOROLOGY ACTIVITIES PROGRESS REPORT 2021

(For TC 16th IWS)

(Drafted and Submitted by WGM Chair)

ACTIONS PROPOSED:

The Committee is invited to:

- (a) Take note of the Members activities and major progress and issues in meteorology component in 2021 as reported.
- (b) Review the implementations of all WGM activities conducted in 2021.
- (c) Approve the recommendations and planned activities of WGM for 2022 and beyond.

ANNEXES:

- I. Implementation status of WGM plans in 2021
- II. Proposal plans of WGM activities in 2022
- III. Summary of the 4th WGM Annual Meeting

Progress report on the WGM in 2021
(For TC 16th IWS, Video Conference, 2-3 December 2021)

1. Background

- After the 53rd TC Session, the composition and focal point members list of WGM are:

Chair	Dr. Tang Jie (China)
Vice Chair	Dr. Vicente B. Malano (Philippines) Mr. Muhammed Helmi Abdullah (Malaysia)
Members	Ms. Phalla Peou (Cambodia) Mr. Ryu Ki Ryol (DPR Korea) Mr. K. K. Hon (Hong Kong, China) Mr. Hosomi Takuya (Japan) Mr. Bounteum Sysopanthavong (Lao PDR) Mr. Lok Chan Wa (Macao, China) Mr. Jun Galang (Phillippines) Ms. Won Seonghee (Rep. of Korea) Mr. Lesley Choo (Singapore) Dr. Wattana Kanbua (Thailand) Mr. Christopher Brenchley (USA) Dr. Hoang Phuc Lam (Viet Nam)
Secretary of Mete.	Mr. Clarence Fong

- At the 7th IWS held in Nanjing, China, WGM Chair proposed to restructure the table of Annual Operating Plans (AOPs), namely the inclusion of 2 additional tables, which are the Perennial Operating Plans (POPs) and Preliminary Projects (PPs), and the proposal was adopted by WGM. POPs refer to WGM activities that will be carried out repeatedly in following years while PPs refer to projects which preliminary studies are needed to be undertaken by WGM.
- The action plans in 2021 (including 5 POPs, 9 AOPs and 2 PPs) have been endorsed by 53rd TC Session.

2. Progress of WGM operating plans (POPs, AOPs and PPs) in 2021

- The progress and the results of all the priority plans (include 5 POPs, 9 AOPs and 2 PPs) since the 53rd TC Session as well as the proposed plans for 2022 submitted by the respective coordinators, which were reported as shown in

bullet 2.1 to 2.16.

- The implementation status of WGM operating plans in 2021 including the action plans and completion status; and the proposed operating plans in 2022 including success indicators and budget request are listed in [Annex I](#) and [Annex II](#) respectively.

2.1 POP1: Improve the Algorithm of Typhoon Summer Prediction (Previous name: Development of Typhoon Seasonal Prediction System)

- KMA continues to provide the products of typhoon seasonal prediction for TC Members and distribute the results to Members by email.
- The forecast is based on one statistical model, one dynamical model and two hybrid models.
- A new statistical model is developed, and this new model is used to relate environmental factors (showing the long-distance relationship with TC genesis) to the TC frequency in the distinctive area (east and west of 140°E in the western North Pacific).

2.2 POP2: Collaborative Discussion (CoDi) Forum on TC Analysis and Forecast

- Tropical Cyclone Collaborative Discussion (CoDi) Platform provides real-time exchange of information. User can communicate through online discussions and audio/video conferences. A user manual has been developed.
- The system support various devices, and instant reminder message will be sent to user's email address if user does not check the information.
- During 2021, discussion on upgrade and landfall for tropical cyclone KOGUMA (2014), CEMPAKA (2107) and LUPIT (2109) was carried out on the platform and it was proved to be successful.
- Members are highly encouraged to use the platform to exchange information on tropical cyclone upgrade/downgrade, landfall and difficult cases.

2.3 POP3: Tropical Cyclone Research and Review

- Since its launch in February 2012, 39 issues of *Tropical Cyclone Research and Review* (TCRR) were published, covering the topics of tropical cyclone (TC) intensity and structure, TC climatology, review of TC in history, operational TC forecast verification, TC induced storm surge, flood or wave, and risk management etc.

- Authors come from 16 different countries and regions, two-thirds of them are international authors. Quality of the journal is ensured by strict peer-review, with two-thirds of the reviewers are overseas experts.
- The journal is hosted in different locations, including TCRR official homepage, ScienceDirect and KeAi. Readers spread over 126 Countries, and the full-text download capacity from January to September 2021 exceeded 79000 times.
- Currently, TCRR has been included in four databases: ScienceDirect, DOAJ, CNKI and ESCI.
- Special issue on typhoon-related flood and disaster risk reduction was published (2nd issue in 2021) and planning group of WMO IWTC-10 suggested to publish the topic reports and outcomes on TCRR.

2.4 POP4: Transfer of the Technology of the Typhoon Operation System (TOS)

- Technology transfer has been conducted since 2014 upon Member's request.
- The main objectives are to train the typhoon forecasters on the use of the TOS and to provide follow-on technical assistance to Members on the implementation of TOS.
- Due to COVID-19 pandemic, no technology transfer has been conducted in 2020 and 2021. As informed by KMA, the project was considered completed and closed.

2.5 POP5: Verification of Tropical Cyclone Operational Forecast

- Forecasts of tropical cyclone tracks and intensity from deterministic guidance and ensemble systems in 2020 were evaluated and the results were submitted to the TC53 Session in February.
- Forecast performance of 19 tropical cyclones (2101-2119) in 2021 was carried out. Will continue to issue the summary report on verification of TC forecast products in 2021 typhoon season in western North Pacific.
- It is planned to issue the verification results (data and figures) for other basins and continue to strengthen international cooperation and promote the exchange of TC data and verification techniques through WMO-TLFDP.

2.6 AOP1: Enhanced Use of Ensemble Forecast

- Development with combination of EDA results and GEPs of ECMWF, UKMO,

NCEP and JMA has been in progress.

- JMA updated its global ensemble model in 2021 to increase the number of ensemble members from 27 to 51. RSMC Tokyo investigated its impact on hit rates of probability circles using re-forecast data.
- JMA plans to update its global ensemble model in 2022 with improved prediction model and higher resolution. The new ensemble products will also be utilized in the TC activity map, track forecast probability circle, and TC genesis guidance using EDA and global ensemble.

2.7 AOP2: Improve the Performances and Impacts of South China Sea Typhoon Model

- Model improvement has been carried out in 2021 such as improvement of the 3D reference atmosphere scheme and iterative Semi-Implicit and Semi-Lagrangian (SISL) method in model dynamic core, as well as the improvement of physical parameterization schemes.

2.8 AOP3: Development of Regional Radar Network

- The Guidelines for the Participation in Experimental Regional Radar Composite Data Exchanges in Southeast Asia was developed by BKMKG, JMA, Met Malaysia and TMD. JMA, in collaboration with project members, produced a sample regional composite map in 2021 to demonstrate the usefulness of the radar data exchanges.
- An online technical meeting took place from 11 to 12 November 2021 to improve radar techniques and expand the regional radar network in Southeast Asia. Participants agreed to proceed with the project further.

2.9 AOP4: Radar Nowcasting based on RaINS/SWIRL

- Training on RaINS/SWIRL in 2021 was postponed due to COVID-19 pandemic.
- The training is proposed to be held in June 2022 with two participants from TC Members with a duration of 2 weeks.

2.10 AOP5: Storm Surge Watch Scheme

- Verification of storm surge prediction (multi-scenario prediction) in 2020 is being done for stations where sea level observations are available in University of Hawaii

Sea Level Center (UHSLC) data base. The results will be published in the Annual Report of RSMC Tokyo 2020.

- JMA is going to upgrade the storm surge watch scheme model and renew its products in summer 2022.

2.11 AOP6: Contribution for the Experiment on Typhoon Intensity Change in Coastal Area (EXOTICCA-II)

- A set of typhoon field scheme based on surface-ocean-aero-satellite unified platform has been set up. Expect to have 1-3 experiment cases each year. Observation study based on experiment data will be carried out.
- In 2021, experiment on In-Fa (2106) has been carried out by STI.

2.12 AOP7: Enhancing Utilization of Himawari 8/9 Products

- JMA developed a technique to identify Rapidly Developing Cumulus Areas (RDCA) using Himawari 8/9 products. Online lecture was provided to MSS, TMD and VNMHA in February 2020. JMA has been considering a possible next step to provide them with RDCA program for their development.
- JMA and MMD continue the joint development for the RDCA global coefficient to improve RDCA algorithm for Malaysia region.

2.13 AOP8: Parallel Analysis of Satellite Data in Operational Tropical Cyclone Monitoring

- Parallel analysis of TC cases with subjective Dvorak Analysis for both Himawari-8 and FY-4 were carried out.
- A specific seminar on this project is expected to be held online in late December 2021.

2.14 AOP9: Enhancement of Disaster Risk Reduction against Heavy Rain in Collaboration of AOP7 of WGH

- JMA has been providing 1-month ensemble NWP model data and has arranged for providing 3-month ensemble NWP model data to ICHARM.
- JMA has introduced the joint press conferences with MLIT calling for caution against flood disasters, and advised similar cooperation of meteorological and

hydrological organizations in other Member countries.

- JMA cooperated in e-learning workshops of IFI, organized by ICHARM, for the Philippines in April 2021 and Indonesia in October 2021.

2.15 PP1: Workshop on Typhoon Forecasting Techniques and WGM Project Progress Review

- The project was postponed in 2021 due to COVID-19 pandemic.
- A three-day workshop is planned to be held in early Q4/October 2022 for WGM Members and younger operational forecasters from host Member.

2.16 PP2: GK2A Utilization for Tropical Cyclone

- KMA introduced the operational service of GK2A, including lower level winds and rain/wind warning information.
- It is planned to introduce the products in the Workshop on Satellites for Tropical Cyclones (IWSATC-3).

3. Conclusions and the proposed operating plans for 2022

On the basis of the information provided by Members and the respective coordinators of the operating plans and based on the discussions during the Parallel Meeting, the following conclusions were reached:

1. Members have made important progress in the implementation of the TC Strategic Plan during the year 2021.
2. Members made significant progress during 2021 in tropical cyclone monitoring and communication systems, data assimilation and numerical weather prediction systems, tropical cyclone forecast-aiding systems, and scientific understanding of tropical cyclone activities.
3. With the help of Tropical Cyclone Programme (TCP) of WMO and Typhoon Committee Secretariat (TCS), and the absolute sincere cooperation of all Members and the effective efforts of the WGM focal points, WGM has successfully completed the tasks in 2021.
4. Based on the discussion on the operating plans for 2021 during the 16th IWS, it was concluded to adopt the operating plans as follows:
 - i. The POP item 1-3 will be continued in 2022.
 - ii. The POP item 4 will be closed.
 - iii. The POP item 5 will be renamed as item 4 and continued in 2022.
 - iv. The AOP item 1-9 will be continued in 2022.
 - v. The PP item 1-2 will be continued in 2022.
5. The total budget proposed by WGM, which will be concurred at the AWG meeting, for undertaking the operating plans (AOPs, POPs and PPs) in 2022

is US\$38,000. In addition, the budget of US\$12,000 will be allocated for the cross-cutting project (PP1) between WGM and TRCG.

6. The proposed WGM 2022 operating plans (AOPs, POPs and PPs) including the actions, the success indicators, coordinators and budget is listed in [Annex II](#).

Annex I: Status of Perennial Operating Plans (POPs), Annual Operating Plans (AOPs) and Preliminary Projects of WGM in 2021

Status of Perennial Operating Plans (POPs) of WGM in 2021

SP's KRA & SG	No.	Objective	Action	Success Indicators	Funding (Req. & S.)	Organizer	Participants	Coordinator	Remarks	Status of Completion
KRA1 KRA2 KRA6	1	Improve the algorithm of typhoon summer prediction (Previous name: Development of typhoon seasonal prediction system)	(a) To improve typhoon summer prediction techniques (b) To share knowledge and encourage member's cooperation	(a) Provide the information of typhoon summer prediction via e-mail for member countries on late May (2021-) (b) Submission of the progress report	/	KMA	/	Dr. Se Hwan Yang (KMA)	Change the objective, action and success indicators (2021-)	Yes
KRA 6 SG 6b SG 6c	2	Collaborative Discussion (CoDi) Forum on TC Analysis and Forecast	(a) To encourage Members' typhoon forecasters to use this platform for instant or real time online discussions or information exchange (b) To run routinely.	Submission of the progress report	/	CMA, HKO, TCS	Members	Mr. Qian Chuanhai (CMA) Mr. Wong Wai-Kin (HKO) Ms. Lu Xiaoqing (CMA)	Continued (2018-)	Yes
KRA 1 - 6	3	Tropical Cyclone Research and Review	(a) To publish the journal quarterly in 2021. (b) Improvement of the editorial procedure and the journal's influence	Submission of the progress report	US\$9,000	CMA	Members	Dr. Wang Dongliang, (CMA) Ms. Zhou Xiao (CMA)	Continued (2013-)	Yes
KRA 1 KRA 2 KRA 6 SG 6b SG 6c	4	Transfer of the Technology of the Typhoon Operation System (TOS)	(a) Transfer of analysis and training module step by step (b) Packaging modules (forecast, analysis, training and statistics) (c) More technology transfer will be continued upon Member's requests.	Submission of the progress report	US\$6,000	KMA	Members	Mr. Kim Dongjin (KMA)	Continued (2014-) Subject to COVID19	Yes and closed
KRA1 KRA2 KRA6 SG 6b SG 6c	5	Verification of tropical cyclone operational forecast	(a) Continue to issue the summary report on verification of TC forecast products in 2020 typhoon season in western North Pacific. (b) Plan to issue the verification results (data and figures) for other basins.	(a) Submission of the post-season verification report for TC Session (b) Progress report on the improvement of evaluation system for tropical cyclone forecast	-	CMA, HKO	Members	Mr. Chen Guomin (CMA), Mr. Wong Wai-Kin (HKO)	Continued (2015-)	Yes

SP's KRA & SG	No.	Objective	Action	Success Indicators	Funding (Req. & S.)	Organizer	Participants	Coordinator	Remarks	Status of Completion
			(c) Continue to strengthen international cooperation and promote the exchange of TC data and verification techniques through WMO-TLFDP.							

Status of Annual Operating Plans (AOPs) of WGM in 2021

SP's KRA & SG	No.	Objective	Action	Success Indicators	Funding (Req. & S.)	Organizer	Participants	Coordinator	Remarks	Status of Completion
KRA 1 KRA 2 KRA 6 /SG 6b and 6c	1	Enhanced use of ensemble forecast	(a) To further develop tropical cyclone genesis guidance using early Dvorak Analysis (EDA) and global ensemble.	(a) Provide verification results. (b) Submit progress report	/	JMA	/	Mr. HOSOMI Takuya (JMA)	Continued (2011-)	In progress
KRA1 KRA2 KRA6	2	Improve the performances and impacts of South China Sea typhoon model	(a) To improve model techniques and data assimilation. (b) To perform typhoon ensemble forecasting.	Submission of the assessment of performance report of model	/	CMA	Viet Nam, PAGASA, MMD	Dr. Chen Zitong (CMA)	Continued (2012-)	Yes
KRA1 KRA2	3	Development of regional radar network	(a) To further refine quality control techniques applied to the participants' radar networks, including dual pol. radars, to improve their quality of radar composites. (b) To implement and refine MMD and TMD's QPE calibration using rain-gauge with technical assistance of JMA.	Submission of the progress report by involved Members	US\$8,000	TMD, MMD, JMA	Lao PDR, Viet Nam, Philippines	Mr. Asmadi Abdul Wahab (MMD) Ms. Patchara Petvirojchai (TMD) Mr. HOSOMI Takuya (JMA)	Continued (2011-)	In progress

SP's KRA & SG	No.	Objective	Action	Success Indicators	Funding (Req. & S.)	Organizer	Participants	Coordinator	Remarks	Status of Completion
			<p>(c) To support applicants to join the experimental radar data exchange in the near future, and to share the progress with the RA II/V WIGOS radar project in Southeast Asia.</p> <p>(d) To compose a user's guide among JMA, MMD and TMD.</p> <p>(e) Submission of progress reports by participants. Upon the receipt of the reports, holding follow-up technical meeting(s) to identify a way forward.</p>							
KRA1 KRA2 KRA3	4	Radar nowcasting based on RaINS/SWIRL	<p>Training for two participants from two ESCAP/WMO TC Member Countries. Topics of training are:</p> <p>(a) Composite radar reflectivity from multiple radars</p> <p>(b) Retrieve radar reflectivity from satellite data using AI.</p> <p>(c) Blending radar data with satellite derived radar reflectivity.</p> <p>(d) Nowcasting of Radar-Satellite Blend</p> <p>(e) Preparation of progress report</p>	Presentation and Submission of the progress report	US\$5000	Met Malaysia, HKO	TBC	Mr. Hamray Muhammad Yazit (MET Malaysia), Mr. Nursalleh K Chang (MET Malaysia), Mr. Yip Weng Sang (MET Malaysia) Mr. Wong Wai Kin (HKO)	Continued (2019-) Subject to COVID-19	Postponed due to COVID-19

SP's KRA & SG	No.	Objective	Action	Success Indicators	Funding (Req. & S.)	Organizer	Participants	Coordinator	Remarks	Status of Completion
KRA 1 KRA 2 KRA 4 /SG4(a)	5	Storm surge watch scheme	(a) To add storm surge time series prediction points if requested by Members. (b) To publish verification results of storm surge predictions. (c) To request Members to provide complete hourly sea level data of at least one year to provide accurate astronomical tides at the stations. (d) To request Members to provide sea level observations during storm surge events for verification of storm surge predictions.	Submission of the progress report	/	JMA	/	Mr. HOSOMI Takuya (JMA)	Continued (2012-)	Yes
KRA1 KRA2 KRA6	6	Contribution for the Experiment on Typhoon Intensity Change in Coastal Area (EXOTICCA-II)	(a) To implement the field campaign collaboration among participating Members by using aircraft, airship, rocket drop-sondes etc. (b) To collect and share the field observation and research data (c) Demonstration research on tropical cyclone intensity change in conjunction with WMO-TLFDP (to be included in the TC Fellowship Scheme).	Submission of the progress report	/	CMA, HKO	Participant Members (KMA, TMD)	Dr. LEI Xiaotu (CMA) Dr. TANG Jie (STI) Mr. WONG Wai-Kin (HKO)	Continued (2014-)	Yes
KRA 4 KRA 6 SG6(a)	7	Enhancing Utilization of Himawari 8/9 Products	(a) To improve RDCA algorithm through the joint development with technical assistance by JMA to MMD. (b) To provide supports for development of RDCA by MSS, TMD and VNMHA. (c) Submission of progress reports by the participants. Upon the receipt of the reports, holding follow-up	Submission of the progress report.	US\$9,000	JMA	MMD, MSS, TMD, VNMHA	Mr. MINEMATSU Hiroaki (JMA) Mr. Asmadi Abdul Wahab (MMD) Mr. Wong Songhan (MSS) Ms. Patchara Petvirojchai (TMD) Mr. Vo Van Hoa	Continued (2018-)	In progress

SP's KRA & SG	No.	Objective	Action	Success Indicators	Funding (Req. & S.)	Organizer	Participants	Coordinator	Remarks	Status of Completion
			technical meeting(s) to identify a way forward.					(VNMHA)		
	8	Parallel analysis of satellite data in operational tropical cyclone monitoring (Available data used in operational tropical cyclone analysis)	<ul style="list-style-type: none"> (a) To hold a specific seminar on this project. (b) To invite other agencies (like JTWC, KMA, HKO) into parallel analysis. (c) To submit a summary. 	Submission of the progress report	US\$7,000	CMA	Members interested in this project	Ms. XIANG Chunyi (CMA)	Continued	Yes
Cross-cutting project	9	Enhancement of disaster risk reduction against heavy rain in collaboration of AOP7 of WGH	<p>To support AOP7 of WGH through</p> <ul style="list-style-type: none"> (a) Providing 1-month and 3-month ensemble NWP model data, necessary for the project and available, to ICHARM. (b) Sharing the knowledge such as characteristics and features related to NWP. (c) Continuing sharing knowledge and experience on awareness raising through lectures for online workshops and meetings of IFI project (d) Promoting awareness with hydrological authorities to both local governments and public, including the appropriate use of products 	Submission of the progress report	/	JMA	Philippines	Mr. HOSOMI Takuya (JMA)	Continued (2019-)	In progress

Status of Preliminary Projects (PPs) of WGM in 2021

SP's KRA & SG	No.	Objective	Action	Success Indicators	Funding (Req. & S.)	Organizer	Participants	Coordinator	Remarks	Status of Completion
KRA1 KRA2 KRA3	1	Workshop on typhoon forecasting techniques and WGM project progress review	(a) Training for the younger operational forecaster on the typhoon forecasting new techniques (b) Review the progress of WGM projects	Submission of the progress report	US\$12,000	Met Malaysia (in cooperation with WGM and TRCG)	WGM members and younger operational forecaster from host Member	MET Malaysia (in cooperation with WGM and TRCG) Ms. Nor Khafiza Manan (MET Malaysia) Mr. Wong Wai-kin (HKO)	Subject to COVID-19 situations in Malaysia.	Postponed due to COVID-19 (MET Malaysia had written to the TCS in April 2021 on the postponement of this project in 2021 due to COVID-19 situation in Malaysia.)
KRA1 KRA4	2	GK2A Utilization for Tropical Cyclone	(a) Introduce GK2A upper level products related typhoon forecast and share the technique using GK2A data (b) Submit progress reports. Upon the receipt of the reports, holding follow-up technical meeting(s) to identify a way forward.	Submission of the progress report	-	KMA	-	Mr. Jun Park (KMA)	New project	Yes

Annex II: Proposal for Perennial Operating Plans (POPs), Annual Operating Plans (AOPs) and Preliminary Projects of WGM in 2022

Proposal for the Perennial Operating Plans (POPs) of WGM in 2022

SP's KRA & SG	No.	Objective	Action	Success Indicators	Funding (Req. & S.)	Organizer	Participants	Coordinator	Remarks
KRA1 KRA2 KRA6	1	Improve the algorithm of typhoon summer prediction (Previous name: Development of typhoon seasonal prediction system)	(a) To improve typhoon summer prediction techniques (b) To share knowledge and encourage member's cooperation	(a) Provide the information of typhoon summer prediction via e-mail for member countries on late May (b) Submission of the progress report	/	KMA	/	Dr. Se Hwan Yang (KMA)	Continued (2021-)
KRA 6 SG 6b SG 6c	2	Collaborative Discussion (CoDi) Forum on TC Analysis and Forecast	(a) To encourage Members' typhoon forecasters to use this platform for instant or real time online discussions or information exchange (b) To run routinely.	Submission of the progress report	/	CMA, HKO, TCS	Members	Mr. Qian Chuanhai (CMA) Mr. Wong Wai-Kin (HKO) Ms. Lu Xiaoqing (CMA)	Continued (2018-)
KRA 1 - 6	3	Tropical Cyclone Research and Review	(a) To publish the journal quarterly in 2022. (b) Improvement of the editorial procedure and the journal's influence	Submission of the progress report	US\$9,000	CMA	Members	Dr. Wang Dongliang (CMA) Ms. Zhou Xiao (CMA)	Continued (2013-)
KRA1 KRA2 KRA6 SG 6b SG 6c	4	Verification of tropical cyclone operational forecast	(a) To carry out post-season verification on the operational forecast of 2021 typhoon and report to Committee session. (b) To further improve the verification methodologies of evaluation system for typhoon forecast and conjunction with WMO-TLFDP. (c) To offer fellowship for training on (b).	(a) Submission of the post-season verification report for TC Session (b) Progress report on the improvement of evaluation system for tropical cyclone forecast	-	CMA, HKO	Members	Mr. Chen Guomin (CMA), Mr. Wong Wai-Kin (HKO)	Continued (2015-)

Proposal for the Annual Operating Plans (AOPs) of WGM in 2022

SP's KRA &SG	No.	Objective	Action	Success Indicators	Funding (Req. & S.)	Organizer	Participants	Coordinator	Remarks
KRA 2	1	Enhanced use of ensemble forecast	(a) To further develop tropical cyclone genesis guidance using early Dvorak Analysis (EDA) and global ensemble.	(a) Provide verification results. (b) Submit progress report	/	JMA	/	Mr. HOSOMI Takuya (JMA)	Continued (2011-)
KRA1 KRA2 KRA6	2	Improve the performances and impacts of South China Sea typhoon model	To Improve the performances and impacts of TRAMS. (a) Dynamical core: improve time-varying reference scheme, and the calculation accuracy of model's lower levels SL advection scheme. (b) Physical processes: improve convection parameterization scheme and develop a micro-physic scheme with AI learning capabilities. (c) Model products: Improve typhoon intensity forecast products and typhoon maximum wind speed products.	Submission of the assessment of performance report of model	/	CMA	Viet Nam, PAGASA, MMD	Dr. Chen Zitong (CMA)	Continued (2012-)
KRA2 KRA5	3	Development of regional radar network	(a) To further refine quality control techniques applied to the participants' radar networks, including dual pol. radars, to improve their quality of radar composites. (b) To implement and refine MMD and TMD's QPE calibration using rain-gauge with technical assistance of JMA.	Submission of the progress report by involved Members	US\$8,000	TMD, MMD, JMA	Lao PDR, Viet Nam, Philippines	Mr. Asmadi Abdul Wahab (MMD) Ms. Patchara Petvirojchai (TMD) Mr. MINEMATSU Hiroaki (JMA)	Continued (2011-)

SP's KRA & SG	No.	Objective	Action	Success Indicators	Funding (Req. & S.)	Organizer	Participants	Coordinator	Remarks
			<p>(c) To support applicants to join the experimental radar data exchange in the near future, and to share the progress with the RA II/V WIGOS radar project in Southeast Asia.</p> <p>(d) To compose a user's guide among JMA, MMD and TMD.</p> <p>(e) Submission of progress reports by participants. Upon the receipt of the reports, holding follow-up technical meeting(s) to identify a way forward.</p>						
KRA1 KRA2 KRA3	4	Radar nowcasting based on RaINS/SWIRL	<p>Training for two participants from two ESCAP/WMO TC Member Countries. Topics of training are:</p> <p>(a) Composite radar reflectivity from multiple radars</p> <p>(b) Retrieve radar reflectivity from satellite data using AI.</p> <p>(c) Blending radar data with satellite derived radar reflectivity.</p> <p>(d) Nowcasting of Radar-Satellite Blend</p> <p>(e) Preparation of progress report</p>	Presentation and Submission of the progress report	US\$5,000	Met Malaysia, HKO	TBC	Mr. Hamray Muhammad Yazit (MET Malaysia), Mr. Nursalleh K Chang (MET Malaysia), Mr. Yip Weng Sang (MET Malaysia) Mr. Wong Wai Kin (HKO)	Continued (2019-) Subject to COVID-19

SP's KRA &SG	No.	Objective	Action	Success Indicators	Funding (Req. & S.)	Organizer	Participants	Coordinator	Remarks
KRA 2 KRA 3 KRA 5 KRA 7	5	Storm surge watch scheme	<ul style="list-style-type: none"> (a) To add storm surge time series prediction points if requested by Members. (b) To publish verification results of storm surge predictions. (c) To request Members to provide complete hourly sea level data of at least one year to provide accurate astronomical tides at the stations. (d) To request Members to provide sea level observations during storm surge events for verification of storm surge predictions. (e) To upgrade the storm surge watch scheme model and renew SSWS products on the NTP website 	Submission of the progress report	/	JMA	/	Mr. HOSOMI Takuya (JMA)	Continued (2012-)
KRA1 KRA2 KRA6	6	Contribution for the Experiment on Typhoon Intensity Change in Coastal Area (EXOTICCA-II)	<ul style="list-style-type: none"> (a) To implement the field campaign collaboration among participating Members by using aircraft, Unmanned Surface Vessel (UAS), airship, rocket, high-resolution radar etc. (b) To collect and share the field observation and research data (c) Demonstration research on tropical cyclone intensity change in conjunction with WMO-TLFDP (to be included in the TC Fellowship Scheme). 	Submission of the progress report	/	CMA, HKO	Participant Members (KMA, TMD)	Dr. TANG Jie (STI) Mr. WONG Wai-Kin (HKO) Dr. LEI Xiaotu (CMA)	Continued (2014-)

SP's KRA & SG	No.	Objective	Action	Success Indicators	Funding (Req. & S.)	Organizer	Participants	Coordinator	Remarks
KRA 2 KRA 5	7	Enhancing Utilization of Himawari 8/9 Products	<ul style="list-style-type: none"> (a) To improve RDCA algorithm through the joint development with technical assistance by JMA to MMD. (b) To provide supports for development of RDCA by MSS, TMD and VNMHA. (c) Submission of progress reports by the participants. Upon the receipt of the reports, holding follow-up technical meeting(s) to identify a way forward. 	Submission of the progress report.	US\$9,000	JMA	MMD, MSS, TMD, VNMHA	Mr. MINEMATSU Hiroaki (JMA) Mr. Asmadi Abdul Wahab (MMD) Mr. Wong Songhan (MSS) Ms. Patchara Petvirojchai (TMD) Mr. Nguyen Vinh Thu (VNMHA)	Continued (2018-)
	8	Parallel analysis of satellite data in operational tropical cyclone monitoring (Available data used in operational tropical cyclone analysis)	<ul style="list-style-type: none"> (a) To hold a specific seminar on this project. (b) To invite other agencies (like JTWC, KMA, HKO) into parallel analysis. (c) To submit a summary. 	Submission of the progress report	US\$7,000	CMA	Members interested in this project	Ms. XIANG Chunyi (CMA)	Continued
KRA 1 KRA 2 KRA 3 KRA 4 KRA 5	9	Enhancement of disaster risk reduction against heavy rain in collaboration of AOP7 of WGH	<p>To support AOP7 of WGH through</p> <ul style="list-style-type: none"> (a) Providing 1-month and 3-month ensemble NWP model data, necessary for the project and available, to ICHARM. (b) Sharing the knowledge such as characteristics and features related to NWP. (c) Continuing sharing knowledge and experience on awareness raising through lectures for online workshops and meetings of IFI project (d) Promoting awareness with hydrological authorities to both local governments and public, including the appropriate use of products 	Submission of the progress report	/	JMA	Philippines	Mr. HOSOMI Takuya (JMA)	Continued (2019-)

Proposal for the Preliminary Projects (PPs) of WGM in 2022

SP's KRA & SG	No.	Objective	Action	Success Indicators	Funding (Req. & S.)	Organizer	Participants	Coordinator	Remarks
KRA1 KRA2 KRA3	1	Workshop on typhoon forecasting techniques and WGM project progress review	<p>(a) Training for the younger operational forecaster on the typhoon forecasting new techniques</p> <p>(b) Review the progress of WGM projects</p>	Submission of the progress report	US\$12,000	Met Malaysia (in cooperation with WGM and TRCG)	WGM members and younger operational forecaster from host Member	MET Malaysia (in cooperation with WGM and TRCG) Ms. Nor Khafiza Manan (MET Malaysia) Mr. Wong Wai-kin (HKO)	Subject to COVID-19 situations in Malaysia.
KRA1 KRA4	2	GK2A Utilization for Tropical Cyclone	<p>(a) Introduce GK2A upper level products related typhoon forecast and share the technique using GK2A data</p> <p>(b) Submit progress reports. Upon the receipt of the reports, holding follow-up technical meeting(s) to identify a way forward.</p>	Submission of the progress report	-	KMA	-	Mr. Jun Park (KMA)	Continued

Report of the 4th Annual Meeting of Working Group on Meteorology (WGM)

I. Organization of the Meeting

1. The 4th Annual Meeting of Working Group on Meteorology (WGM) was scheduled to be held in Malaysia in 2021 in conjunction with the WGM's PP1 "Workshop on Typhoon Forecasting Techniques". Due to COVID-19 pandemic, Malaysia requested to postpone the project. After discussion with Chair of WGM, the Meeting was held in China using video conference (VC) on 28 October 2021.
2. The VC was hosted by Shanghai Typhoon Institute (STI) of China. 11 of 14 Members and Typhoon Committee Secretariat (TCS) about 35 participants attended the VC. The agenda and participant list can be found in Annex I and II, respectively.
3. The VC was moderated by Dr. Tang Jie, Chair of WGM from STI, China. The main purpose of the VC was to review the progress of the annual priority plans of WGM in 2021, and to discuss the implementation plans in 2021.

II. Progress of WGM Annual Priority Plans in 2021 and Implementation Plans for 2022

4. In 2021, WGM has 16 annual priority plans (including 5 POPs, 9 AOPs and 2 PPs). Representatives from the participating Members reviewed the progress of the plans in the meeting. Due to COVID-19 pandemic, some of the plans were postponed.
5. The Members also discussed the implementation plans for 2022. POP4 by KMA will be completed and closed, while other plans will continue in 2022 with the same budget.
6. There is no proposal for new preliminary project.
7. Details of the progress and plans for the annual priority plans are included in the WGM progress report to be submitted at IWS16.

III. Progress of the Establishment of AP-TCRC

8. STI gave a presentation for the progress of the establishment of AP-TCRC. The agreement between AP-TCRC and TC has been drafted and will be submitted to AWG for discussion in IWS16.
9. An opening ceremony is scheduled on 30 November 2021. WMO and TC will be invited to join the ceremony by online meeting. (Note: the ceremony was held on 1 December 2021)

IV. Date and Venue of the 5th Annual Meeting

10. Met Malaysia proposed to host the Meeting in 2022 in conjunction with the typhoon forecaster workshop (PP1), but the plan will be subjected to COVID-19 situations in Malaysia.

V. Other Business




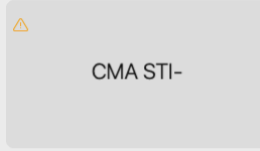











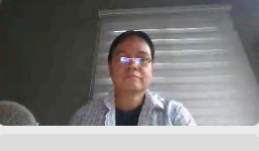



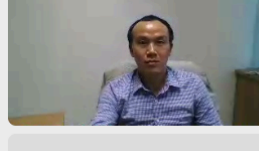
11. Hong Kong, China discussed the case of tropical cyclone LUPIT (2109). There was a probability for a weakening and a re-development downstream which might receive a new TC name. The online discussion with RSMC Tokyo proved to be useful and Members were encouraged to join the online discussion platform for real-time communication.
12. RSMC Tokyo announced the coming RSMC Tokyo Attachment Training to be held 11-13 January 2022 online with no screening process.
13. Being no other business, the VC was closed at 5:00 pm on 28 October 2021.

TENTATIVE AGENDA

Time	Activities	Presenters
14:00-14:15 (15 min)	<ul style="list-style-type: none"> • Welcome address: STI • Opening address: WGM Chair • Remarks: WGM Vice Chairs • Introduction by Members 	<ul style="list-style-type: none"> • STI • WGM Chair and Vice Chairs • Members
14:15-16:45 (150 min)	<ul style="list-style-type: none"> • Presentation on POP/AOP/PPs (10 minutes each) 	<ul style="list-style-type: none"> • Project coordinators
16:45-17:15 (30 min)	<ul style="list-style-type: none"> • Discuss and draft Priority Plans for 2022 (including new plans) for 16th IWS 	<ul style="list-style-type: none"> • Project coordinators and Members
17:15-17:30 (15 min)	<ul style="list-style-type: none"> • Progress of the establishment of APTCRC 	<ul style="list-style-type: none"> • STI
17:30-18:00 (30 min)	<ul style="list-style-type: none"> • Date and place for the 5th Annual Meeting • Any other business • Closing remarks • Group photo 	

Annex II Participant list of the 4th Annual Meeting of WGM

Cambodia	Ms. PEOU Phalla	phallapeou1@gmail.com
China	Dr. Jie TANG	tangj@typhoon.org.cn
	Mr. Guomin CHEN	chengm@typhoon.org.cn
	Dr. Dongliang WANG	wangdl@typhoon.org.cn
	Dr. Xin HUANG	huangx@typhoon.org.cn
	Dr. Chunyi XIANG	xiangcy@cma.gov.cn
Hong Kong, China	Mr. HON Kai-kwong	kkhon@hko.gov.hk
Japan	Mr. HOSOMI Takuya	hosomi@met.kishou.go.jp
	Mr. HIGAKI Masakazu	higaki@met.kishou.go.jp
	Mr. SUGANO Jumpei	j-sugano@met.kishou.go.jp
	Mr. MOCHIZUKI Yasushi	y-mochizuki@met.kishou.go.jp
	Mr. KOIDE Naohisa	koide-n@met.kishou.go.jp
	Mr. FUKUURA Takashi	t_fukuura@met.kishou.go.jp
	Mr. MINEMATSU Hiroaki	minematsu_hi@met.kishou.go.jp
	Ms. MIURA Mai	m_miura@met.kishou.go.jp
	Mr. NARITA Masami	m_narita@met.kishou.go.jp
	Mr. HASEGAWA Hiroshi	h_hasegawa@met.kishou.go.jp
	Mr. OMORI Shiro	s-ohmori@met.kishou.go.jp
	Lao PDR	Mr. Bounteum SISOUPHANTHAVONG
Macao, China	Ms. IP Teng Teng	ttip@smg.gov.mo
Malaysia	Mr. LIM Ze Hui	zhlim@met.gov.my
Philippines	Dr. Vicente B. MALANO	vmalano@pagasa.dost.gov.ph
	Mr. Juanito GALANG	jungalang2313@gmail.com
	Dr. Esperanza CAYANAN	eocayanan@gmail.com
Republic of Korea	Mr. PARK Jun Dong	jun.park@kma.go.kr
	Ms. LEE Jung-Rim	jrleeng@korea.kr
	Ms. WON Seonghee	shwon@kma.go.kr
	Mr. BAEK Seonkyun	sun@kma.go.kr
	Ms. SON Joohyung	joohyung@korea.kr
	Dr. CHA Eun Jeong	cha@kma.go.kr
Thailand	Dr. Wattana KANBUA	wattkan@gmail.com
Viet Nam	Mr. HOANG Lam	lamhpn@gmail.com
USA	Mr. Chris BRENCHLEY	christopher.brenchley@noaa.gov
TCS	Mr. Clarence Fong	cfong@typhooncommittee.org
	Mr. Michael Fu	michael@typhooncommittee.org

 TCS - Clar... (Cohost, me)			 CMA STI-	 KK Hon, HKO
				
				
				
FUKUURA Takashi, J...	HIGAKI, M. JMA	Michael FU/TCS	Shiro Omori, JMA	TCS Webex Host