# MEMBER REPORT
# Macao, China

ESCAP/WMO Typhoon Committee
13th Integrated Workshop
Chiang Mai, Thailand
5-9 November 2018

# CONTENTS

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

## 1. Meteorological Assessment

As of the time of compiling this report, six tropical cyclones affected Macao, China since Nov 2017, including Tropical Storm Ewiniar (1804), Tropical Strom Son-Tinh (1809), Severe Tropical Strom Bebinca (1816), Super typhoon Mangkhut (1822), Tropical storm Barijat (1823) and one Tropical Depression (no name). Their tracks and the periods of issuing the Tropical Cyclone Signals in Macao are shown in fig. 1 and table 1 respectively. Their meteorological influences are described below in details.

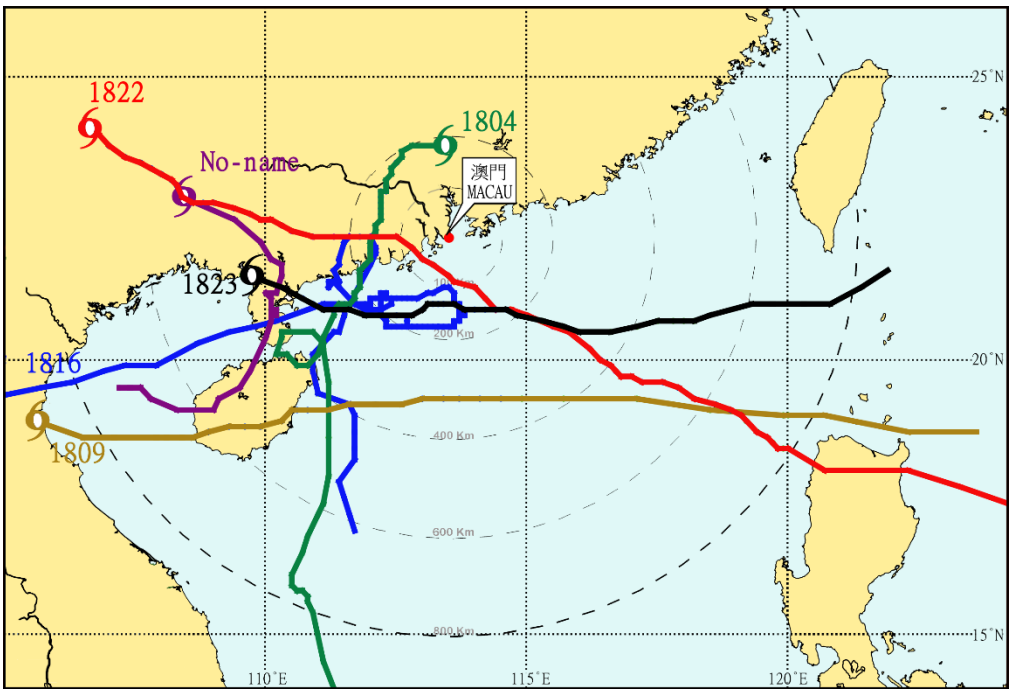


***Figure 1*** *Tropical cyclone tracks that affected Macao, China since Nov. 2017.*

**Tropical Storm Ewiniar (1804)**

Ewiniar is the first tropical cyclone affected Macao in 2018. It came closest to Macao at 6 am on June 8, about 150 km to the west-northwest of Macao.

Approaching of Ewiniar made the winds in Macao to increase gradually and reach force 6 at night on June 7. The first typhoon signal no.3 in 2018 was issued. In addition, due to joint effect of Ewiniar and the southwest monsoon, over 200mm cumulative rainfall was recorded during June 6 – 8. Rainstorm warning was issued on June 8 as hourly rainfall reached 46mm, led to flooding in multiple areas.

**Tropical Strom Son-Sinh (1809)**

Son-Sinh moved across the northern part of the South China Sea from west to east. It was closest to Macao at 8pm on July 17, about 320km south of Macao. Influenced by Son-Sinh, winds in Macao increased to Force 7 between nighttime on 17 and early morning on 18, while typhoon signal no.3 was in effective.

**Tropical Depression "Nameless"**

The tropical depression came closest to Macao at 8am on July 24, about 340km west of Macao. Since the tropical depression was weak and its size was small, its influence on Macao was minimal. Macao was only affected by its outer rainbands and experienced several showers.

**Severe Tropical Storm Bebinca (1816)**

Bebinca led to the issue of first typhoon signal no.8 in 2018. It also broke the record of the longest duration of issuing typhoon signal in Macao, a total of 138 hours. Due to the weak steering flow, Bebinca moved very slowly over the northern part of the South China Sea (SCS) with twist and turn during Aug 9 – 15. Though Bebinca was weak while it was lingering the northern SCS, its associated outer rainbands affected Macao serval times. Rainstorm warnings were issued on Aug 10 and 11 respectively with the highest hourly rainfall of 53.6mm.

Bebinca came closest to Macao at night on Aug 14, about 100km south of Macao. Since it was so close that it might cause great impact on Macao, typhoon signal no.8 was issued. However, as gale force winds were centered at the southern part of Bebinca's storm circle, its influence on Macao was not significant. The maximum mean winds was 52.9 km/hr with maximum gusts 67.3km/hr in Macao. At the same time under the joint effect of strong winds and astronomical tide, blue storm surge warning was effective on Aug 9 - 15. There were light flooding in low-lying areas.

**Tropical Storm Barijat (1823)**

Barijat was developed in the Bashi Channel and moved westwards across the north South China Sea. It came closest to Macao at night on Sep 12, about 130 km South of Macao. Though Barijat was close to Macao, only typhoon signal no. 3 was issued because it was weak and small. In addition, as deep convection mainly developed in Barijat's southern halve, only 2.2mm rainfall amount was recorded. In summary, the impact of Barijat to Macao was minimal.

**Super Typohoon Mangkhut (1822)**

Super typhoon Mangkhut is the strongest tropical cyclone that strike Macao after Hato last year. It caused great impact to Macao and led to issue of typhoon signal no.10 and black storm surge warning. Due to its great intensity and large circulation, it severely affected Macao for a long period of time even after it landed. Under its influences, the typhoon signal no. 10 lasted for 9 hours, the longest duration of typhoon signal no.10 in Macao.

Mangkhut came closest to Macao at 4pm on Sep 16, about 60 km southwest of Macao. Winds of force 12 was experienced over widespread areas in Macao, with the maximum mean winds 137 km/hr and the maximum gusts 189 km/hr. Serious flooding occured in low-lying areas from morning to late night on 16$^{th}$. The highest flooding level was estimated about 1.9m or above. In addition, during the period of the tropical cyclone signals being effective, 148mm cumulative rainfall was recorded.

***Table 1*** *The Tropical Cyclone Signals issued by Macao Meteorological and Geophysical Bureau during the tropical cyclones affected period.*

| Start Date | End Date | Name | The Highest Signal |
|---|---|---|---|
| Jun 05, 2018 | Jun 08, 2018 | Ewiniar | No. 3 |
| Jul 17, 2018 | Jul 18, 2018 | Son-Sinh | No. 3 |
| Jul 23, 2018 | Jul 24, 2018 | Tropical Depression | No. 1 |
| Aug 09, 2018 | Aug 15, 2018 | Bebinca | No. 8 |
| Sep 11, 2018 | Sep 13, 2018 | Barijat | No. 3 |
| Sep 15, 2018 | Sep 17, 2018 | Mangkhut | No. 10 |

***Table 2*** *Extreme values recorded during the passage of Typhoon Mangkhut.*

| Minimum Station Pressure | Maximum Wind Speed | Maximum Gust |
|---|---|---|
| 969.0hPa<br>(TG station) | 137.16 km/h<br>(PV station) | 188.64 km/h<br>(PN station) |

## 2. Hydrological Assessment

Nil.

## 3. Socio-Economic Assessment

Macao was hit by six tropical cyclones in 2018. Unfortunately two of them were strong enough to merit the issue of typhoon signal no. 8 and one of them even reached typhoon signal no 10. Although the typhoon Bebinca caused the issue of typhoon signal no. 8, its damage to Macao was not significant. No people were injured or killed during the typhoon and the number of incidents was less, as other typhoons occurred this year. Besides, the intensity of Typhoon Mangkhut was almost the same as Typhoon Hato last year, however, its damages to Maco were less than Hato. 40 injuries and no death were recorded during its strike. According to the Fire Services Bureau, the Public Security Police Force and the Customs of Macao SAR, there were a total of 794 incidents caused by the typhoon, including a total of 75 trees fallen down, 296 cases of billboards and windows collapsed or tottered and 227 of other incidents. Comparing to the disaster caused by Hato last year, there was a great improvement of Macao SAR in disaster risk reduction. Lots of measures in Macau were implemented this year, especially on solving the problem of flooding in low-lying areas caused by storm surge. The number of flooding occurred during typhoon Mangkhut was only 34 cases, 50% lesser than the number during Typhoon Hato. There was only a small area suffering blackout and water supply stoppages. Only a small group of citizens was affected.

***Table 3*** *Damages caused by tropical cyclones in Macao during 2018.*

| Date/Time | | Name | The Highest Signal Issued | Incidents (cases) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start | End | | | Flooding | Landslide | Fallen Trees | Walls (Collapsed/ Tottered) | Billboards/ Awnings/ Windows/ (Collapsed/ Tottered) | Scaffoldings/ Fencings/ Crane (Collapsed/ Tottered) | Power cables/ Lampposts (Collapsed/ Tottered) | Injuries | Death | Others |
| 05-06-18 10H45 | 08-06-18 21H45 | Ewiniar (1804) | 3 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 4 |
| 17-07-18 04H00 | 18-07-18 12H30 | Son-Tinh (1809) | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 23-07-18 15H45 | 24-07-18 12H30 | Tropical Depression | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 |
| 09-08-18 17H00 | 15-08-18 11H00 | Bebinca (1816) | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 11-09-18 17H00 | 13-09-18 10H00 | Barijat (1823) | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 15-09-18 21H00 | 17-09-18 19H00 | Mangkhut (1822) | 10 | 34 | 2 | 75 | 8 | 296 | 26 | 126 | 40 | 0 | 227 |

Eight rainstorm warnings were issued in 2018. The following table shows that the downpour caused minor damages to Macao. From the table, we have learnt that the main problem Macao facing is the flooding problem. When there is a great amount of rainfall, flooding will occur in low-lying areas. The Macao SAR is making lots of related measures to solve this problem.

***Table 4*** *Damages caused by rainstorms during 2018.*

| Date/Time | | Incidents (cases) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Start** | **End** | **Flooding** | **Fallen Trees** | **Buildings collapsed/ Concrete spalled off** | **Billboards collapsed or tottered** | **Scaffoldings collapsed or tottered** | **Windows collapsed or tottered** | **Awnings collapsed or tottered** | **Landslide** | **Deaths / Injuries** | **Others** |
| 08-05-2018 04H35 | 08-05-2018 08H00 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 08-06-2018 05H35 | 08-06-2018 09H55 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 22-06-2018 11H35 | 22-06-2018 15H00 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10-08-2018 16H30 | 10-08-2018 17H30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 11-08-2018 06H33 | 11-08-2018 08H50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 |
| 27-08-2018 21H45 | 28-08-2018 02H00 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 01-09-2018 11H15 | 01-09-2018 12H50 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 02-09-2018 06H40 | 02-09-2018 08H00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

## 4. Regional Cooperation Assessment

Since July, Macao started to attend the National Weather Briefing and Weather Briefing of Guangdong Province. Weather forecasters will be able to understand countrywide expert's opinion on the weather phenomenon in the near future through these briefing. During the approaching of "Mangkhut", two joint briefings between CMA, HKO and SMG was held for exchanging both the analysis and the forecast of the intensity and track. It was found very useful in the precaution and reduction of disaster.

An expert meeting will be held for WGM AOP "The third assessment report on the Climate Change Impacts on Tropical Cyclones in the Typhoon Committee region (TCAR3)" on 26th and 27th November in Macao. This meeting serves as a platform for the experts from China, Hong Kong, China, USA, Japan and Korea respectively in sharing their process as well as the opinion on the compilation of the report. It is an honor for SMG, the coordinator of the project, to host this meeting.

## II. Summary of Progress in Priorities supporting Key Result Areas

1. **Revision of the Executive Orders related to "Tropical Cyclone Signal" and "Storm Surge Warning System"**

   **Main text:**

   The Executive Orders related to "Tropical Cyclone Signal" and "Storm Surge Warning System" were revised this year. The main differences of both signal/warning systems from the old ones are listed below:

   i. Two new grades of classification of tropical cyclones are added
   ii. The levels of Storm Surge Warning increase to five levels. Furthermore, a precaution message will be released before the formal issue of storm surge warning in order to raise the attention of public.
   iii. Using 10 minute-average of wind speed as a standard of evaluation of the intensity and influence of the tropical cyclones.

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

   Nil.

   **Priority Areas Addressed:**

   KRA 2: Enhance capacity to generate and provide accurate, timely and understandable information using multi-hazard impact-based forecasts and risk-based warnings.

   KRA 3: Improve typhoon-related flood control measures and integrated water resource management.

   KRA 4: Strengthen typhoon-related disaster risk reduction activities in various sectors, including increased community-based resiliency with better response, communication, and information sharing capability.

   **Contact Information:**

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2. **Establish of the consultation for tropical cyclone**

**Main text:**

When a tropical cyclone is expected to affect Macau, the consultation, which includes directors, chiefs of divisions, duty forecasters and operational technicians, will be initiated. Through the discussion of the participants, the influence of tropical cyclone on Macao can be evaluated as well as the message to the public will be decided.

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

Nil.

**Priority Areas Addressed:**

KRA 4: Strengthen typhoon-related disaster risk reduction activities in various sectors, including increased community-based resiliency with better response, communication, and information sharing capability.

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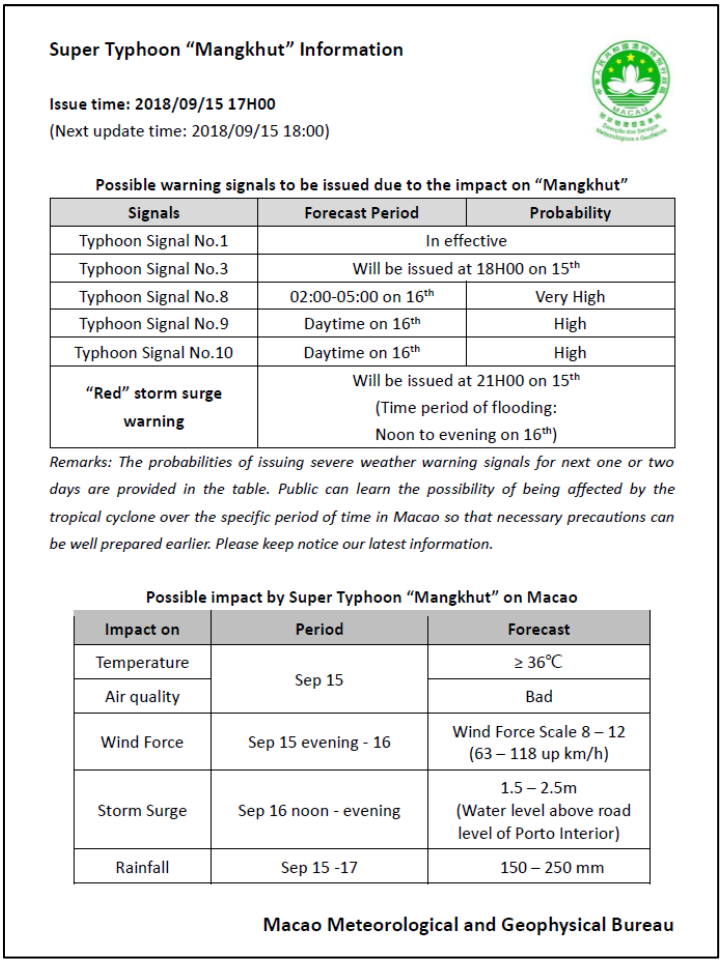
3. **Improve the release of information**

**Main text:**

In order to enhance public awareness of severe weather, especial the approaching of tropical cyclones and storm surges, some improvements in the information-release mechanism are made:

i. The predicted time and possibility of issue of different TC signals and storm surge warning will be released once Signal No.1 is issued.
ii. Storm surge precaution message will be released before the formal issue of storm surge warning in order to raise the attention of public.
iii. Precaution message will be released to the public through internet, APPS to public 2 or 3 hours before the expected occurrence of the severe weather.



**Super Typhoon "Mangkhut" Information**

**Issue time: 2018/09/15 17H00**
(Next update time: 2018/09/15 18:00)

**Possible warning signals to be issued due to the impact on "Mangkhut"**

| Signals | Forecast Period | Probability |
|---|---|---|
| Typhoon Signal No.1 | In effective | |
| Typhoon Signal No.3 | Will be issued at 18H00 on 15th | |
| Typhoon Signal No.8 | 02:00-05:00 on 16th | Very High |
| Typhoon Signal No.9 | Daytime on 16th | High |
| Typhoon Signal No.10 | Daytime on 16th | High |
| **"Red" storm surge warning** | Will be issued at 21H00 on 15th (Time period of flooding: Noon to evening on 16th) | |

*Remarks: The probabilities of issuing severe weather warning signals for next one or two days are provided in the table. Public can learn the possibility of being affected by the tropical cyclone over the specific period of time in Macao so that necessary precautions can be well prepared earlier. Please keep notice our latest information.*

**Possible impact by Super Typhoon "Mangkhut" on Macao**

| Impact on | Period | Forecast |
|---|---|---|
| Temperature | Sep 15 | ≥ 36℃ |
| Air quality | | Bad |
| Wind Force | Sep 15 evening - 16 | Wind Force Scale 8 – 12 (63 – 118 up km/h) |
| Storm Surge | Sep 16 noon - evening | 1.5 – 2.5m (Water level above road level of Porto Interior) |
| Rainfall | Sep 15 -17 | 150 – 250 mm |

**Macao Meteorological and Geophysical Bureau**

***Figure 2*** *The predicted time and possibility of issue of different TC signals and storm surge warning, as well as the possible weather impact from Super Typhoon "Mangkhut".*

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

Nil.

**Priority Areas Addressed:**

KRA 2: Enhance capacity to generate and provide accurate, timely and understandable information using multi-hazard impact-based forecasts and risk-based warnings.

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4. **Promotion of the new warning system as well as the knowledge of meteorology and disaster risk reduction**

**Main text:**

Short educational videos related to storm surge and rainstorm were released to raise the public awareness. These videos will introduce major threats caused by the said severe weather phenomenon. More videos are scheduled to be released in the coming year in order to aware the public of the threats of different weather phenomenon.

Some booklets about tropical cyclone signals, storm surge warning system were also published for the promotion of the new warning systems to the public.

To increase the knowledge and interest of students in meteorology, SMG gives lectures on different topics in schools every year, each topic will be prepared in two versions, one for primary schools and the other for secondary schools. Schools can choose between Chinese, Portuguese and English as their preferred language for lectures. More than 1884 students from 17 schools attended the lectures, and the lectures have been ongoing in different schools. Furthermore, several open seminar on tropical cyclone, storm surge, the new warning system as risk reduction were held in this summer.


***Figure 3*** *Lectures of Severe Weather for a) students, b) teachers and parents, in different schools in 2018.*


***Figure 4*** *Several open seminar on tropical cyclone, storm surge, the new warning system for a) education associations, b) social public associations, in the summer of 2018.*

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

Nil.

**Priority Areas Addressed:**

KRA 2: Enhance capacity to generate and provide accurate, timely and understandable information using multi-hazard impact-based forecasts and risk-based warnings.

KRA 4: Strengthen typhoon-related disaster risk reduction activities in various sectors, including increased community-based resiliency with better response, communication, and information sharing capability.

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## 5. Personnel capacity-building

**Main text:**

In order to promote the ability of the meteorological staffs, SMG staffs were sent to different on-job training, workshops and seminar. These included:

i. Sending weather forecaster to HKO by means of on-job training
ii. Attending different workshops and seminars, such as SWIRL workshop, TC Roving Seminar, IWS etc.


***Figure 5*** *SMG staffs attended various workshops, such as a) IWTCLP-4 was held in Macao during December 5 – 8, 2017, b) SWIRL workshop training from HKO, etc.*

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

**Priority Areas Addressed:**
KRA 4: Strengthen typhoon-related disaster risk reduction activities in various sectors, including increased community-based resiliency with better response, communication, and information sharing capability.

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6. **Improve collaboration and emergency response capabilities through internal and external exercises**

**Main text:**
Comprehensive emergency system exercise for power supply was conducted in SMG and was assisted by Company of Electricity of Macao (CEM), thereby strengthening the ability of both parties to respond to the strain and improve the response mechanism.

***Figure 6*** *SMG was assisted by Company of Electricity of Macao (CEM) during the exercise of power system failure.*

Communication network failure causing the data interruption from automatic weather station and unavailable of information release system was simulated in the exercise. SMG immediately launched an emergency response mechanism to handle

the simulated incident and successfully released weather information through fax, mobile communication equipment and other means.

***Figure 7*** *Emergency response mechanism was launched to released weather information during the simulation of communication network failure.*

Meanwhile, power system failure was also simulated. The uninterruptible power system (UPS) and backup generators in SMG can operate in the event of normal power interruption, allowing the relevant information release system and instruments to operate stably and ensure the release of necessary information.

***Figure 8*** *The uninterruptible power system (UPS) and backup generators were examined during the exercise of power system failure.*

Through the exercise, the operation of the emergency system within the bureau was comprehensively examined and inadequacies are being improved gradually, Emergency response capabilities within departments are strengthened, and fully prepared for the wind season. The exercise progressed smoothly and achieved the expected results.

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

Nil.

**Priority Areas Addressed:**

KRA 4: Strengthen typhoon-related disaster risk reduction activities in various sectors, including increased community-based resiliency with better response, communication, and information sharing capability.

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## 7. Statistical analysis of climate data related to tropical cyclones and storm surges in Macao

**Main text:**

Detailed statistical analysis of past climate data, especially the characteristics of tropical cyclones and storm surges affecting Macao, is expected to enable meteorological technicians to more objectively predict high impact weather.

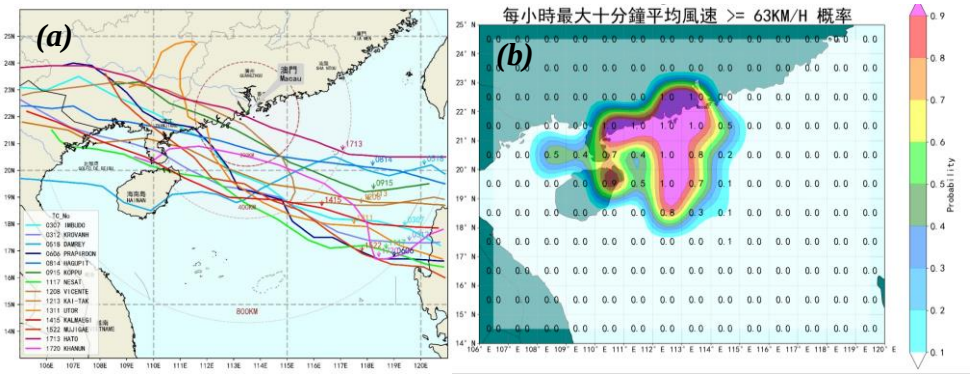


***Figure 9*** *The a) track and b) range of probabilities of tropical cyclones (grade typhoon or above, from 2012-2017) affected Macao which cause the recorded wind >=63 km/h (standard of signal no.8).*

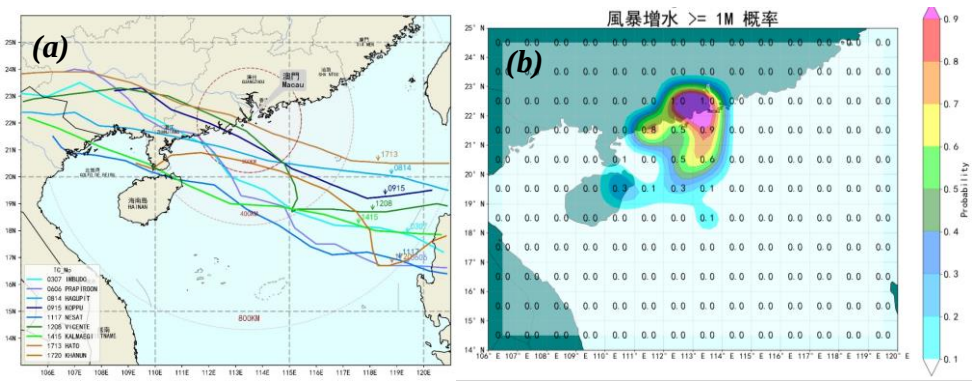


***Figure 10*** *Same as figure 9, which caused the recorded highest water level from storm surge >=1 meter (standard of yellow storm surge warnings).*

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

Nil.

**Priority Areas Addressed:**

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## 8. Enhanced public weather service

**Main text:**

SMG has continuously been enhancing the provision of services for various phenomenon, such as tropical cyclones, storm surge, general weather warnings as well as advices on air pollutions. Thru automating this publication of notices by means of SMS, public can have a very clear picture about the current situation, either weather and air quality status. In addition, SMG has also enhanced the promotion on either storm surge as well as the new measures for different typhoon signals, through the usage of multimedia as well as pdfs. Public can be a better understanding on the details for all typhoon signals and storm surge warning categories. Moreover, stickers on lamp posts, situated at lying low areas, indicating

different flood levels have also been introduced such that the general public can visualized easily.

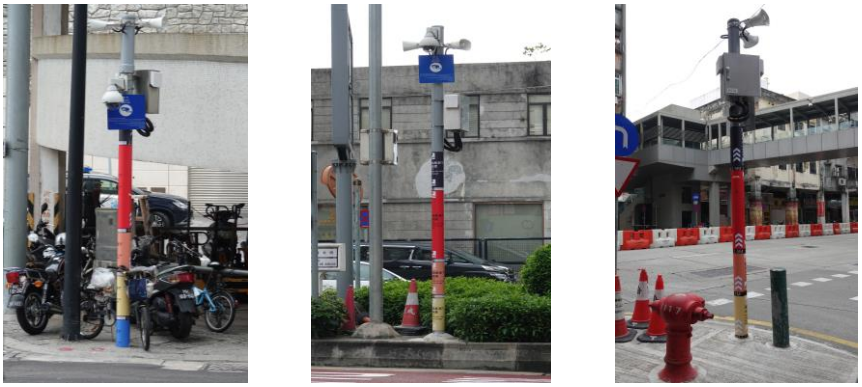

***Figure 11*** *Stickers indicating different flood levels on lamp posts, situated at a,b) Inner Harbour, c) Rua Norte (Rua da Ribeira do Patane).*

During severe weather occasions, especially tropical cyclones attack, SMG has also been optimizing our warning systems. Strengthen the communication and coordination with relevant departments, medias and the general public by issuing pre-warning messages. We have also had video conference meetings with CMA and HKO in discussing the trends for tropical cyclones and possible damages that could took place. Nevertheless, more products relating to tropical cyclones have also be enhanced such that more detailed information could be delivered to the general public and allows them to better understand the current weather situation.

SMG is preparing to revamp our webpage and mobile APP. This should be made available by the end of this year, which tends to better facilitate the general public and offering a better look and feel for describing the weather. User-friendliness and in-depth information mine could be found in this new design layout. Ensuring the provision of all the important weather information during severe weather occasions as well as daily weather forecasts are our main goal.

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

Nil.

**Priority Areas Addressed:**

KRA 2: Enhance capacity to generate and provide accurate, timely and understandable information using multi-hazard impact-based forecasts and risk-based warnings.

KRA 4: Strengthen typhoon-related disaster risk reduction activities in various sectors, including increased community-based resiliency with better response, communication, and information sharing capability.

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## 9. Drill and Emergency Plan with Government Departments and Organizations in Preparation for Severe Weather

**Main text:**

Civil Defence drill in 2018

The Macao Civil Protection and Coordination Centre will stage an annual typhoon drill every year to test the coordination and communication among members in dealing with typhoon-related incidents. In 2018, an annual drill named “Crystal Fish” was conducted in April. As mentioned in the above point, the Unitary Police Service has launched the “Storm Surge evacuation plan for low-lying areas during typhoon”, that’s why the “Crystal Fish” simulated the issuing of typhoon signal No. 8 and a black storm surge warning was issued, which coincides with the astronomical tide, serious flooding of 1.5 meters or more will occur in the low-lying areas; Through this simulation, the Unitary Police Service want to test the practicality and operation of the new "Evacuation Plan" and the "Emergency Command Application Platform". At the same time, it also examines and strengthens the emergency management capability of members of the civil defense structure.

***Figure 12*** *New “Evacuation Plan” was simulated and examined during the annual drill named “Crystal Fish”.*


***Figure 13*** *A number of society organizations were invited to participate in the drill.*

The exercise lasted for 5 hours and simulated 31 accidents that may have occurred during the typhoon. The member of civil defense structure and the society organizations has sent around 1,700 participates (including 80 society personnel and residents) to participate. This is the first time that a number of society organizations were invited to participate in the drill. Through this invitation, can help strengthen the cooperation between the members of the civil defense structure and the residents, and jointly improve the capacity of the civil defense emergency system for the disaster prevention and reduction.

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

Nil.

**Priority Areas Addressed:**

We are planning to improve the emergency plan and adding more members to the civil protection structure. In the coming years, we plan to increase and improve the frequency and level of difficulties of the drills.

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## 10. Public Education and Works of Civil Defence in Macao

**Main text:**

The Macao SAR government will commit to disaster prevention and reduction in the future and has already formulated short-term, medium-term, and long-term plans regarding to Civil Defence. In terms of the medium and long-term plans, it started in November last year. Beside the dissemination of disaster prevention knowledge to neighborhood associations, elderly centers and schools, our Civil Protection and Coordination Center (Centro de Coordenação e Protecção Civil)-CCPC(named in short form) started cooperation with the Education and Youth Bureau in the beginning of this year to make amendments and suggestions for the school's disaster prevention plan and guidelines. We held a large-scale meeting with high school officials throughout Macau in mid-April, explaining details of the newly revised Campus Disaster Prevention Plan and Guidelines while in May, we went to schools to publicize the above plans and guidelines for students as a step to actualize the government's plans for disaster prevention and reduction.

In recent months, we have also conducted joint promotional activities with Fire Services Bureau, Customs and Judiciary Police Department to get integrated and interaction with the public in different ways, enhancing the public's awareness of disaster prevention and self-help. As requested by various departments of the Macao government and other private institutions, such as the Civic and Municipal Affairs Bureau, the Education and Youth Affairs Bureau, the Macau Deaf Association, and the Villagers Association of Coloane etc, some of them have also had meetings with us and others, we are planning to hold civil defense introductions meeting then.

On April 28 this year, we conducted a Storm Surge Evacuation Plan in Low-Lying Arears during Typhoon and for the typhoon named Crystal Fish and we also took apart in the Social Advisory Committees in Central and North District to answer questions on civil defense work. It is expected that we can communicate with people in an open manner.

Fortunately, on 15th of September of this year, during the period of typhoon “Mangkhut”, the residents managed to use the civil defense knowledge properly. When they left home, they followed the instructions of the frontline staff and left in a safe and orderly manner. They paid close attention to the information on typhoon on radio, television and government websites, and to take measures against wind and water. The construction sites had been strengthened with scaffolding

while scales and other engineering facilities were put indoors or in safe places during typhoon. As for the Low-lying areas such as shore and underground parking garages, many citizens installed their own waterproof gates and they left as soon as possible after the installation. They didn't stay inside and so they could avoid accidents caused by the high water level. As a result, no one died during this typhoon and as a civil defense member, we were thankful for this outcome.


***Figure 14*** *During the period of typhoon "Mangkhut", the residents managed to use the civil defense knowledge properly and try their best to prevent damages from the coming typhoon on 15th of September 2018.*

In the future, our center will carry out regular publicity activities such as the promotion on disaster and prevention work every week. Our WeChat account was launched in March to let the public know the latest information of The Unitary police Service (Serviços De Polícia Unitários-SPU)-SPU and disaster prevention knowledge arranged by our center. Later on, education in different chapters will be launched to deal with typhoons, fires, flooding, and even gas leaks.

Civil Protection and Coordination Center hopes to implement the plans formulated by the government through publicity and education, aiming to raise public awareness of disaster prevention and self-help and meanwhile building up a more harmonious society and helping our next generation be well prepared.

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

Nil.

**Priority Areas Addressed:**

We are planning to improve the emergency plan and adding more members to the civil protection structure. In the coming years, we plan to increase and improve the frequency and level of difficulties of the drills.

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