NATIONAL REPORT
Submitted by Peoples' Republic of China

BASIC INFORMATION

1. ICG/PTWS Tsunami National Contact (TNC)

The person designated by a Member State to an Intergovernmental Coordination Group (ICG) to represent his/her country in the coordination of international tsunami warning and mitigation activities. The person is part of the main stakeholders of the national tsunami warning and mitigation system. The person may be the Tsunami Warning Focal Point, from the national disaster management organization, from a technical or scientific institution, or from another agency with tsunami warning and mitigation responsibilities.

Name: Mr. Fujiang Yu
Title: Director-General
Organization: National Marine Environmental Forecasting Center (National Tsunami Warning Center, MNR)
Postal Address: 8 Dahuisi, Haidian district, Beijing, China, 100081
E-mail Address:
Telephone Number:
Fax Number:
Cellular Telephone Number:

Name: Ching-chi LAM
Title: Senior Scientific Officer
Organization: Hong Kong Observatory
Postal Address: 134A Nathan Road, Kowloon, Hong Kong, China
E-mail Address:
Telephone Number:
Fax Number:
Website: http://www.hko.gov.hk
Cellular Telephone Number:

2. ICG/PTWS Tsunami Warning Focal Point (TWFP)

A 24 x 7 point of contact (office, operational unit or position, not a person) officially designated by the NTWC or the government to receive and disseminate tsunami information from an ICG Tsunami Service Provider according to established National Standard Operating Procedures. The TWFP may or not be the NTWC.

TWFP Agency name:National Marine Environmental Forecasting Center (National Tsunami Warning Center, MNR)

(if different from NTWC agency)
TWFP Agency Contact or Officer in Charge *(if different from NTWC Agency):*

Name: Mr. Fujiang Yu
Position: Director-General
Telephone Number:
Email address
Postal Address: 8 Dahuisi, Haidian district, Beijing, China, 100081

Postal Address:

TWFP 24x7 point of contact (office, operational unit or position**, not a person**):

Name of office, operational unit or position: Tsunami Warning Center
E-mail Address:
Telephone Number:
Cellular phone number:
Fax:

National Tsunami Warning Centre (if different from the above)
A centre officially designated by the government to monitor and issue tsunami warnings and other related statements within their country according to established National Standard Operating Procedures

NTWC Agency Name: National Marine Environmental Forecasting Center (National Tsunami Warning Center, MNR)
NTWC Agency Contact or Officer in Charge (person):

Name: Mr. Fujiang Yu
Position: Director-General
Telephone Number:
Email address:
Postal Address: 8 Dahuisi, Haidian district, Beijing, China, 100081

3. **Tsunami Advisor(s), if applicable**
(Person, Committee or Agency managing Tsunami Mitigation in country)
Name: National Marine Environmental Forecasting Center
Title:
Postal Address: 8 Dahuisi, Haidian district, Beijing, China, 100081
E-mail Address:
Emergency Telephone Number:
Emergency Fax Number:
Emergency Cellular Telephone Number:

Name: Hong Kong Observatory
Title: Director of the Hong Kong Observatory
Postal Address: 134A Nathan Road, Kowloon, Hong Kong, China.
E-mail Address:
Emergency Telephone Number:
Emergency Fax Number:

Emergency Cellular Telephone Number:

4. Tsunami Standard Operating Procedures for a Local Tsunami (when a local tsunami hazard exists)

In China, National Marine Environmental Forecasting Center (NMEFC) of the Ministry Natural Resources (MNR) is responsible for operating the tsunami warning system. NMEFC was approved to issue national tsunami warning in name of National Tsunami Warning Center, MNR since 2013.

NMEFC operates 24 hours a day, 7 days a week, and identifies and characterizes events that may generate tsunamis, with the support of the PTWC, NWPTAC and the China Earthquake Administration (CEA) which operates the earthquake monitoring and warning system in China. NMEFC received global seismographic network data streams to detect earthquakes in the global field. The Shoreline-based broadband seismic Array including 25 stations was installed to detect earthquakes from seas around China that may trigger local tsunamis.

A tsunami warning operational Decision Supporting System has been developed and put into operation since 2012. The new platform can receive earthquake and sea level monitoring information from multiple sources, trigger tsunami numerical models, produce warning messages and disseminate tsunami warnings or information to the local authorities and the public.

The threshold for tsunami warning operation is an earthquake of magnitude 6.0 occurred within the Chinese seas and greater than 6.5 within the regional and distant sources in NMEFC. The potential local and regional tsunami sources that may affect China mainland include Nankai Trench, Ryukyu Trench, Taiwan and Manila Trench, et al. A color-coded warning system based on tsunami amplitude and seriousness of the hazard has been adopted to facilitate tsunami emergency response. Tsunami warning is divided into three classes: I, II and III meaning serious, moderately serious and common, with color codes Red, Orange and Yellow respectively. The classes IV is tsunami information which meanings no tsunami threat. Details are given below:

(1) Class I (red)
Class I tsunami warning will be declared if the tsunami height is monitored to exceed 3 meters or more by the near-field tide gauge stations.

(2) Class II (orange)
Class II tsunami warning will be declared if the tsunami height is monitored to be between 1.0 and 3.0 meters by the near-field tide gauge stations.

(3) Class III (yellow)
Class III tsunami warning will be declared if the tsunami height is monitored to be between 0.3 and 1.0 meters by the near-field tide gauge stations.
(4) Class IV (information)
Class IV tsunami information will be declared if the tsunami height is monitored to be below 0.3 meter by the near-field tide gauge stations.

If a tsunami warning is in effect, NMEFC will issue tsunami warning messages to governments and agencies that are associated with marine disaster emergency response. Local authorities are authorized to issue evacuation instructions to mitigate the tsunami hazards when necessary.

The tsunami warning would be cancelled two hours after wave amplitude well below 30 centimeter.

In Hong Kong, the tsunami monitoring and warning system is operated by the Hong Kong Observatory (HKO). HKO operates a seismographic network to detect earthquakes in the vicinity of Hong Kong and a tide gauge network to monitor sea levels around Hong Kong. HKO operates round the clock to identify and characterize events that may generate local tsunamis.

Tsunami warnings issued by HKO are disseminated to government departments and related organizations for actions according to the Hong Kong Contingency Plans for Natural Disasters (http://www.sb.gov.hk/eng/emergency/ndisaster/CPND%20with%20Tamar%20Address.pdf), and to the mass media for public announcement.

The threshold for a tsunami warning for local tsunami is an earthquake of magnitude 6.5 or above in the sea or near the coast within 100 kilometres of Hong Kong, or a locally felt strong earth tremors lasting 20 seconds or longer due to a submarine earthquake.

The tsunami warning will be cancelled if the observed heights of sea level fluctuations become lower than 20 centimeters 2 hours after the estimated time of tsunami waves arrival.

5. Tsunami Standard Operating Procedures for a Distant Tsunami (when a distant tsunami hazard exists)

For each situation, please provide the following:

- What organization identifies and characterizes tsunamigenic events?
- What is the threshold or criteria for declaring a potential tsunami emergency?
- What organization acts on the information provided by the agency responsible for characterizing the potential tsunami threat?

- How is the tsunami information (warning, public safety action, etc) disseminated within country? Who is it disseminated to?
- How is the emergency situation terminated?
- For Distant Tsunami Procedures:
  What actions were taken in response to tsunami bulletins issued by PTWC, NWPTAC, and/or SCSTAC during the intersessional period?

In China, NMEFC and HKO are the primary recipients of information on tsunami events from a distant source.

The tsunami warning system operated by NMEFC described in section 4 above also applies to distant tsunamis. In this case, the prospective tsunami generation area under watch extends to the global seas. The threshold for declaring a potential distant tsunami emergency is an earthquake of magnitude M=6.5.

In Hong Kong on the receipt of tsunami messages from PTWC, NWPTAC or SCSTAC, HKO will assess whether a significant tsunami with tsunami height exceeding 0.5 meter above the normal tide level will affect Hong Kong and the estimated time of tsunami arrival (ETA). HKO will issue a tsunami warning if a significant tsunami is expected and the ETA is 3 hours or less. In the case that a tsunami with a height of 0.5 meter or below is expected or if a significant tsunami is expected and the time is more than 3 hours before ETA, tsunami information bulletins will be issued.

A tsunami warning from HKO triggers the tsunami mitigation procedures in Hong Kong. The warning will be disseminated to government departments and public utilities according to the Hong Kong contingency plan for natural disasters, and to all mass media for public announcement. The emergency will terminate after HKO cancels the warning on an event.

6. National Sea Level Network

Please include a table with position and description of stations/sensors, and a map,

There are over 100 tide gauges along the Chinese coasts, which can record sea level fluctuations in one minute's interval. MNR also maintained 1 tsunami buoys in the South China Sea to detect potential tsunami waves generated by earthquakes that occurred in Manila Trench. Now there are 3 coastal tidal gauges transmitted through GTS.

Station name	Location	IOC GLOSS code	Latitude	Longitude	Transmit interval	Type of sensor	Sampling rate
Qinglan	Hainan Province	qing	19.57	110.82	5	Float	1

Shenzhe	Guangdong Province	shen	22.47	113.88	5	Float	1
Zhapo	Guangdong Province	zhap	21.58	111.82	5	Float	1

Tide gauge stations for tsunami monitoring in Hong Kong:

Tide gauge station	Quarry Bay	Shek Pik	Tsim Bei Tsui	Tai Miu Wan	Tai Po Kau	Waglan Island
Location	22°17′28″ N 114°12′48″ E	22°13′13″N 113°53′40″E	22°29′14″ N 114°00′51″ E	22°16′11″N 114°17′19″E	22°26′33″ N 114°11′02″ E	22°10′59″N 114°18′10″E
Sensor type	Float-type	Pneumatic	Sea pressure transducer	Pneumatic	Sea pressure transducer	Sea pressure transducer
Resolution	1 cm	1 cm	1 cm	1 cm	1 cm	1 cm
Sampling	1 min	1 min	1 min	1 min	1 min	1 min
Transmission	Public telephone network	Public telephone network	Public telephone network	Public telephone network	Public telephone network	Radio link
Data Delay	Real-time	Real-time	Real-time	Real-time	Real-time	Real-time
Tide gauge station	Chek Lap Kok	Kwai Chung	Ko Lau Wan	Ma Wan	Cheung Chau	
Location	22°19′14″ N 113°56′43″ E	22°19′25″ N 114°07′22″ E	22°27′31″ N 114°21′39″ E	22°21′50″ N 114°04′17″ E	22°12′51″ N 114°01′23″ E	
Sensor type	Acoustic in air column	Acoustic in air column	Acoustic in air column	Acoustic with sounding tube	Acoustic with sounding tube	
Resolution	1 cm	1 cm	1 cm	1 cm	1 cm	
Sampling	1 min	1 min	1 min	1 min	1 min	
Transmission	Public telephone network	Public telephone network	Public telephone network	Public telephone network	Public telephone network	
Data Delay	Real-time	Real-time	Real-time	Real-time	Real-time	

Locations of the tide gauges in Hong Kong are shown in the map below.

7. Information on Tsunami occurrences

Please include sea level observations, pictures, wave arrival descriptions, public, media, or other responses to warnings, lessons learned, etc.

In 2022, NMEFC issued 76 Tsunami Information Messages in response to 42 major earthquakes occurred globally and no significant sea level rise in connection with tsunami events was observed with these events. This year, the only tsunami record in China was caused by Tonga volcano's eruption:

Tide gauge station	Maximum sea level change recorded in China (Height above normal tide)(cm)
Shipu	22
Wushi	44
Suao	35
Hualian	31
Chenggong	25
Houbihu	30

8. Web sites (URLs) of national tsunami-related web sites

http://www.nmefc.cn/ (NMEFC)
http://www.weather.gov.hk/gts/equake/tsunami_info_warn_e.htm(HKO)
http://scstac.oceanguide.org.cn.(SCSTAC)
https://www.hko.gov.hk/sc/index.html (BSCSTAC)
http://www.oceanguide.org.cn/TsunamiWarning

9. Summary plans of future tsunami warning and mitigation system improvements. *This information will be used to aid the development of the PTWS Medium Term Strategy and the PTWS Implementation Plan.*

1. NMEFC continue to improve its earthquake monitoring capability through cooperation with CEA, maintaining MNR coastal Broadband Array.

2. Improve Smart Tsunami Information Processing System Self-development which developed by SCSTAC's staff using Python language for more specialization and convenience

3. Improve the Global Earthquake Automatic Detecting and Location System and the Volcanic Eruption Display and Sea Level Alarm System which are both Self-development

NATIONAL PROGRAMMES AND ACTIVITIES INFORMATION

10. EXECUTIVE SUMMARY

Brief statement of no more than one page addressing all items discussed in the Narrative section of the National Report

1. The Smart Tsunami Information Processing System (STIPS) is a tsunami early warning and decision-making products release system, which developed by SCSTAC's staff using Python language, and it has been put into full operation at the end of 2022. This system designed for watch stander to make decision in terms of Standard Operating Procedures and warning criteria.

2. Global Earthquake Automatic Detecting and Location System which was Self-development. This system include the near real-time waveform reading and format conversion module, earthquake phase picking module, automatic location and Magnitude calculation module, parameters storage and release module. With the global seismic streams we have, it can realizes the near real-time automatic location to the global moderate-strong earthquake.

3. Developed the Volcanic Eruption Display and Sea Level Alarm System. After the Tonga volcano’s eruption, we designed this system. It can capture volcanic ash alert sheets online to obtain near real-time volcanic eruption information, analyze volcanic eruption types and locations and monitor water level fluctuations to achieve sea level alarm.

4. Build a backup tsunami warning system in Huairou, Beijing to ensure that the backup system can take up the tsunami warning duty services in time in case of major system disasters or failures.

5. In order to enhance the availability and serviceability of SCSTAC, the NMEFC has invited the Hong Kong Observatory to establish and operate a backup center for SCSTAC, namely Backup South China Sea Tsunami Advisory Center (BSCSTAC). BSCSTAC will be activated upon the request of SCSTAC in case SCSTAC cannot function properly to provide its tsunami advisory services for the South China Sea region. since 29 March 2023 the BSCSTAC commenced official operation， all operating systems of the BSCSTAC at the HKO are on hot standby mode on normal days and are ready to take up tasks to support the SCSTAC in providing a tsunami alert service for the South China Sea region as and when necessary.

6. China participated in the Exercise Pacific Wave 2022(PacWave22) in 13 October 2022. As the SCSTAC, NMEFC also took the opportunity to organize SCS regional Tsunami Exercise to. By this chance，The National Tsunami Center also carried out domestic tsunami drills to test China's tsunami warning information release and departmental linkage.

11. NARRATIVE

Detailed description of innovations or modifications to National tsunami warnings procedures or operations since last National Report, tsunami research projects, tsunami mitigation activities and best practices (especially in preparedness and emergency management), tsunami exercises, as well as public education programmes or other measures taken to heighten awareness of the tsunami hazard and risk. …

1. The Smart Tsunami Information Processing System (STIPS) is a tsunami early warning and decision-making products release system, which developed by SCSTAC's staff using Python language, and it has been put into full operation at the end of 2022. This system designed for watch stander to make decision in terms of Standard Operating Procedures and warning criteria. The text bulletins and graphical products can be finally generated through a series of functional modules including: Seismic modules, tsunami observation modules, tsunami scenario database and tsunami modeling modules, coastal impact assessment modules and bulletin production & dissemination modules.

2. Global Earthquake Automatic Detecting and Location System which was Self-development. This system include the near real-time waveform reading and format conversion module, earthquake phase picking module, automatic location and Magnitude calculation module, parameters storage and release module. With the global seismic streams we have, it can realizes the near real-time automatic location to the global moderate-strong earthquake.

3. Developed the Volcanic Eruption Display and Sea Level Alarm System. After the Tonga volcano's eruption, we designed this system. It can capture volcanic ash alert sheets online to obtain near real-time volcanic eruption information, analyze volcanic eruption types and locations and monitor water level fluctuations to achieve sea level alarm.

4. Build a backup tsunami warning system in Huairou, Beijing to ensure that the backup system can take up the tsunami warning duty services in time in case of major system disasters or failures.

5. In order to enhance the availability and serviceability of SCSTAC, the NMEFC has invited the Hong Kong Observatory to establish and operate a backup center for SCSTAC, namely Backup South China Sea Tsunami Advisory Center (BSCSTAC). BSCSTAC will be activated upon the request of SCSTAC in case SCSTAC cannot function properly to provide its tsunami advisory services for the South China Sea region. since 29 March 2023 the BSCSTAC commenced official operation ， all operating systems of the BSCSTAC at the HKO are on hot standby mode on normal days and are ready to take up tasks to support the SCSTAC in providing a tsunami alert service for the South China Sea region as and when necessary.

6. China participated in the Exercise Pacific Wave 2022(PacWave22) in 13 October 2022. As the SCSTAC, NMEFC also took the opportunity to organize SCS regional Tsunami Exercise to. By this chance，The National Tsunami Center also carried out domestic tsunami drills to test China's tsunami warning information release and departmental linkage.

7. NMEFC hosted the "IOC training for seismic and tsunami warning operators on strengthening standard operating procedures for seismic data and tsunami warning in the South China Sea region " in 9-10 Dec 2021 which has Four main topics: (i) new methods and technologies of seismic data processing and analysis; (ii) sea level data processing; (iii) tsunami numerical modelling and forecasting; and (iv) tsunami risk assessment.

8. NMEFC hosted the "the NMEFC-BMKG International Conference on Non-seismic Tsunamis and Complex Tsunamis (online)" with BMKG in 14 July 2022. In order to provide an exchange platform for the development and application of monitoring and warning technologies for non-earthquake tsunamis and complex tsunamis, it is of great significance to enhance the monitoring and warning capabilities of non-earthquake tsunamis

9. NMEFC hosted the " 2022 International Symposium on Applied Technologies for Earthquake and Tsunami Monitoring, Early Warning and Disaster Mitigation in the South China Sea Region" in 20 Dec 2022 . Its

content mainly covers related technologies and applications such as monitoring, warning, numerical simulation, and risk assessment of tsunamis caused by geological activities such as earthquakes, volcanoes, and landslides

10. In 2022, NMEFC also hold a live broadcast event on Nationaldisaster prevention and mitigation day to introduce tsunami warning work, published the “Tsunami questions” and implemented tsunami risk assessment for four vulnerable areas including Hebei Province, Tianjin city and Liaoning province. All of these works are aimed at improving tsunami warning capabilities

……..

Date: 14 July 2023 Name: Jianyu Shi, NMEFC