

XXXI Session of the Intergovernmental Coordination Group for the
Pacific Tsunami Warning and Mitigation System (ICG/PTWS-XXXI)
7-11 April 2025
Beijing, China

Philippine Institute of Volcanology and Seismology -Department of Science and Technology

Country Report

Ma. Mylene Martinez-Villegas
Director III-PHIVOLCS



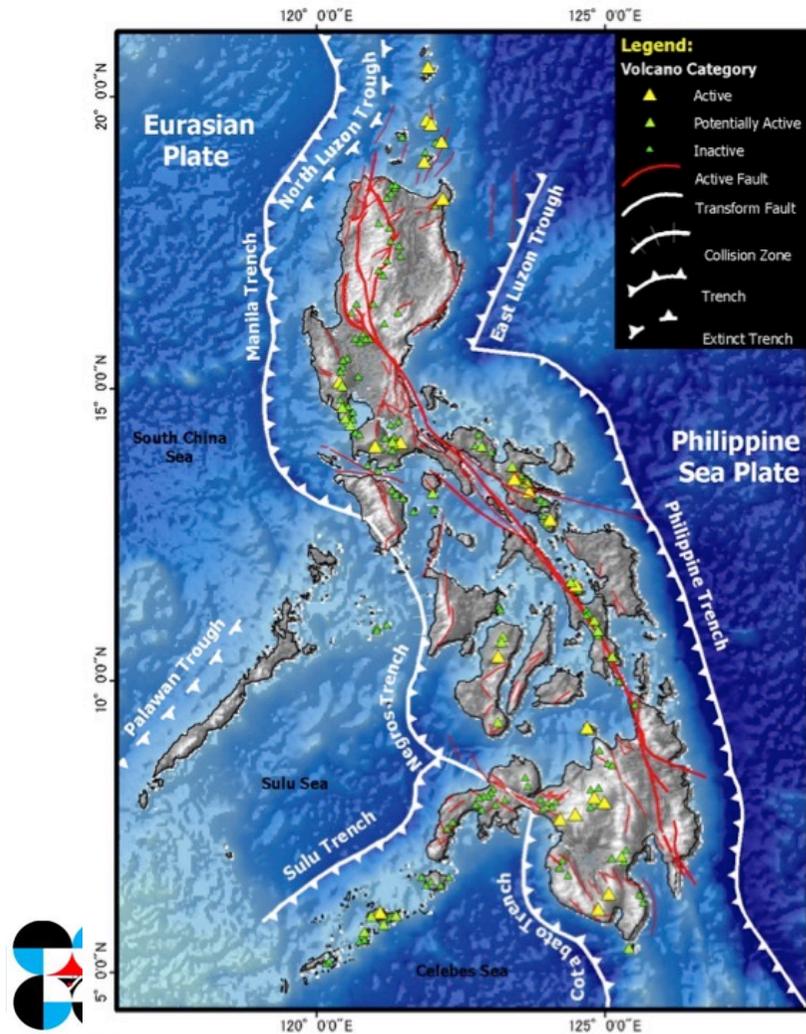
Department of Science and Technology
Philippine Institute of Volcanology and Seismology

KEY ACTIONS FOR DISASTER RISK REDUCTION

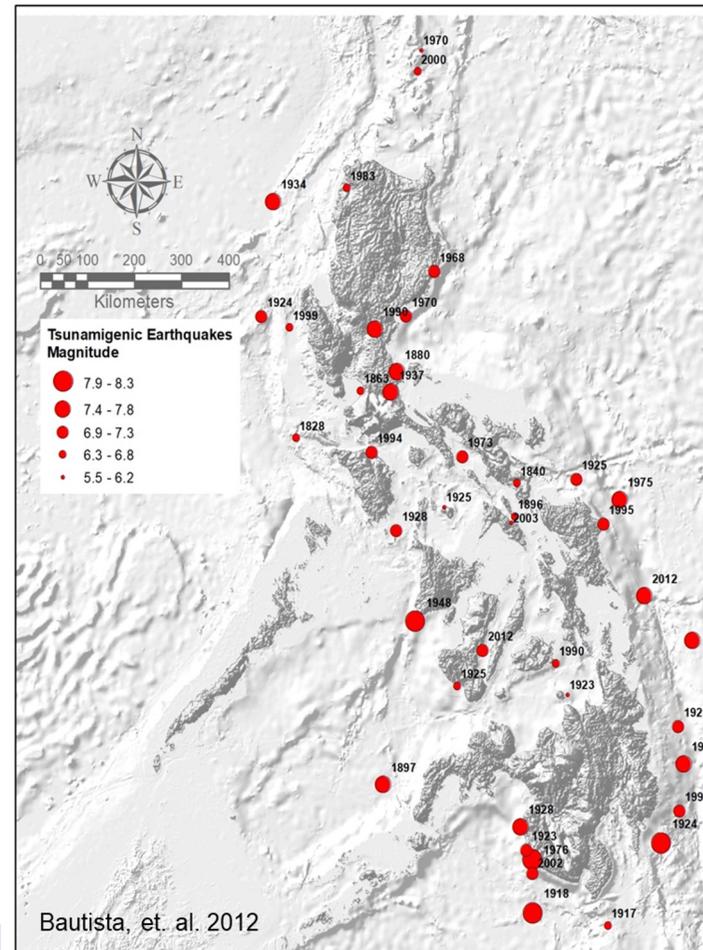
- Know Hazards and Risks
 <Hazard and Risk Assessment
- Monitor
 <Monitoring
- Warn and Disseminate Information
 <Communication
- Respond Properly and Timely
 <Preparedness, Mitigation, Response,
 Recovery



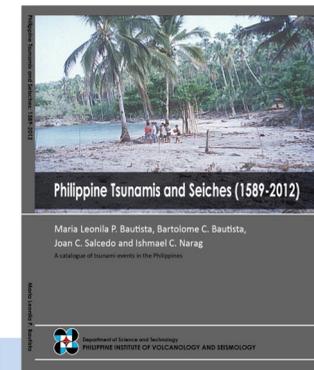
Earthquake Sources



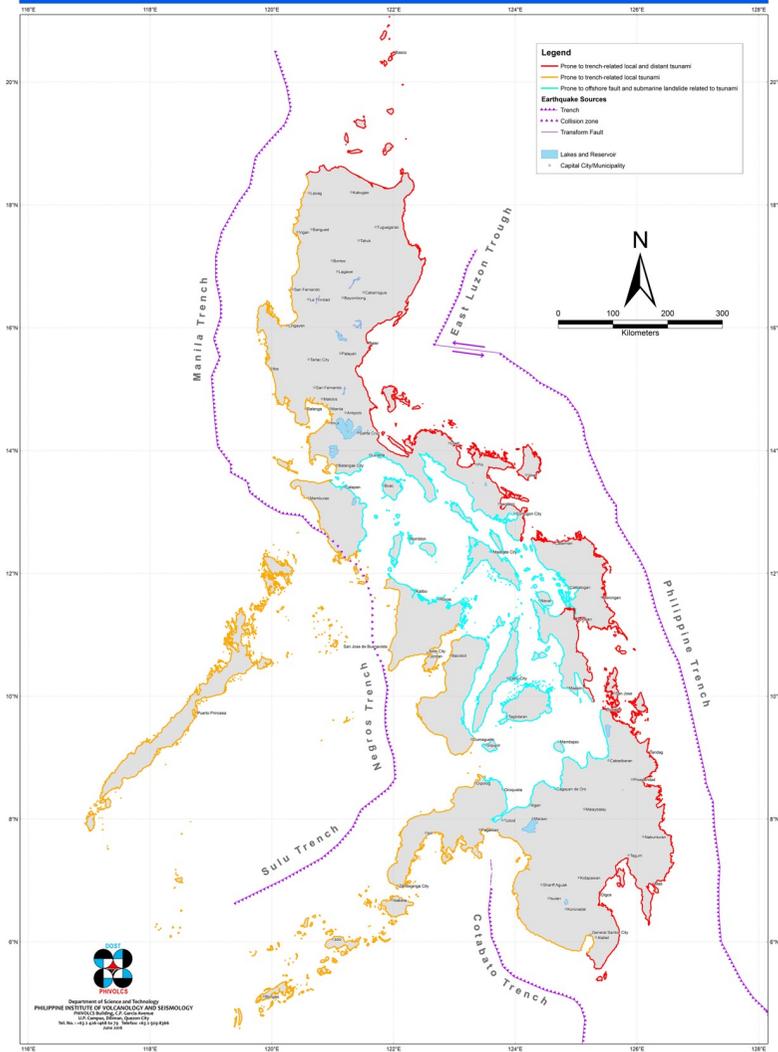
Historical Tsunami in the Philippines



41 confirmed tsunami events based on historical accounts and earthquake catalogues from 1828 to 2012



Tsunami Prone Areas in the Philippines



Tsunami Prone Areas in the Philippines

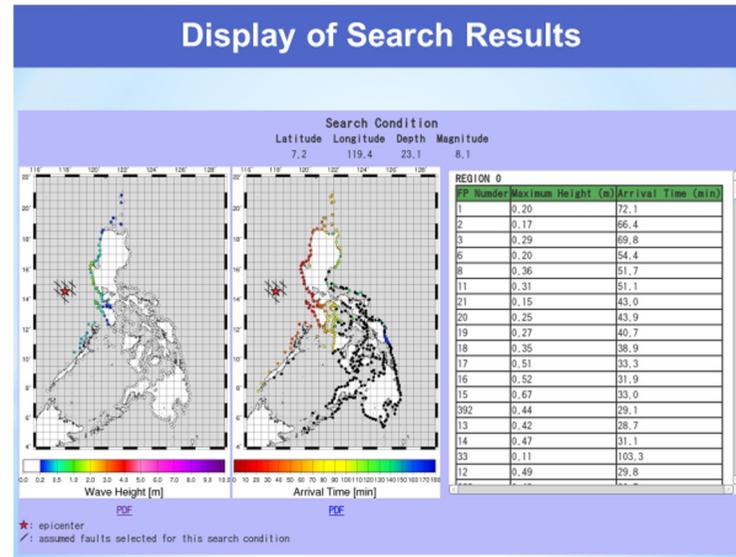
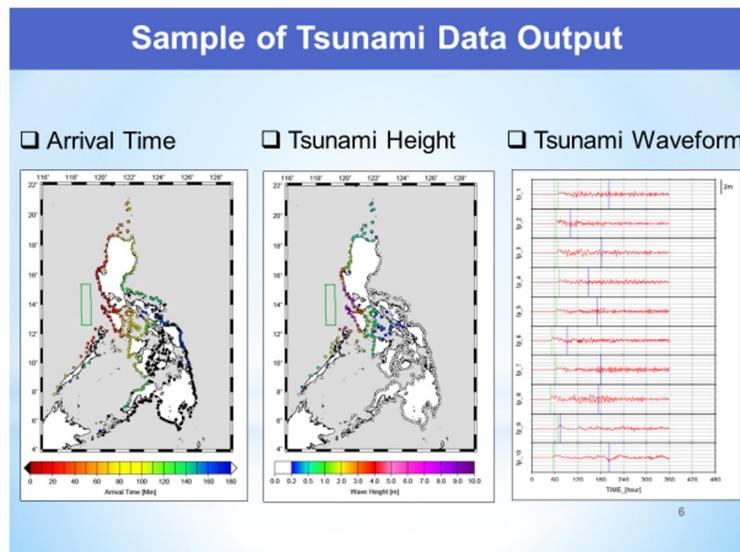
Prone to trench-related local and distant tsunami

Prone to trench-related local tsunami

Prone to offshore fault and submarine landslide related local tsunami

Tsunami Detection, Warning and Dissemination

~30,000 Event-Based Tsunami Scenario Database (2012/2013)



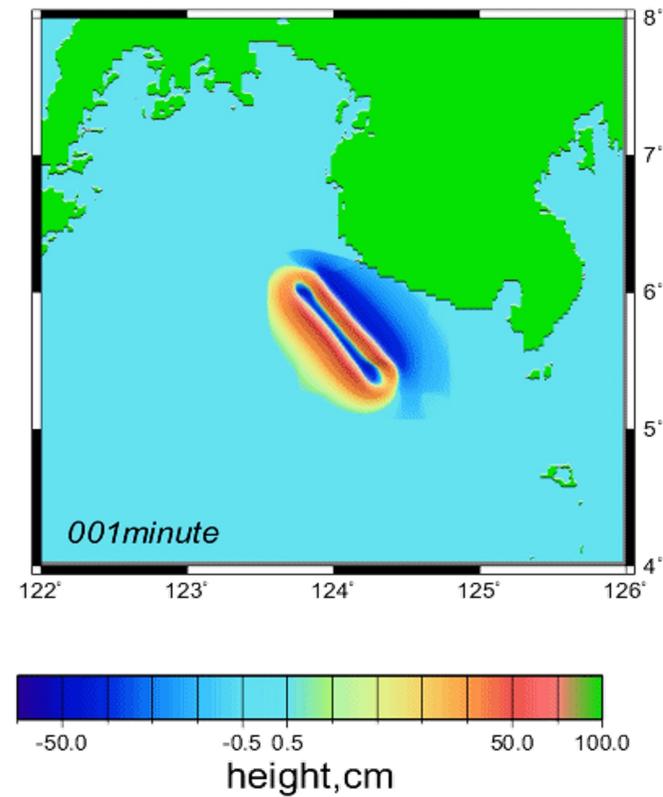
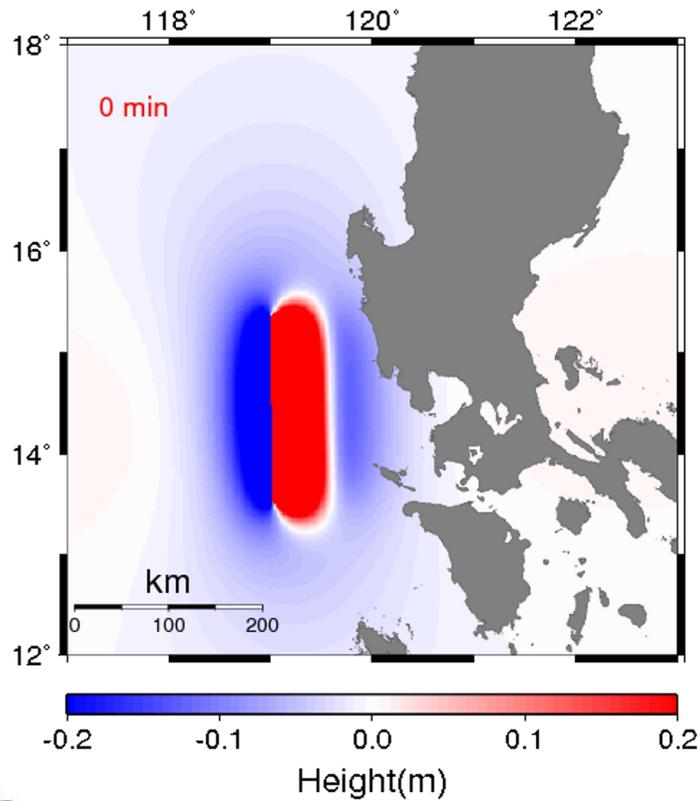
- 0.5 degree interval
- 5 magnitude cases (M8.5, M8.0, M7.5, M7.0, M6.5)

- 5 depth cases (10km, 20km, 40km, 80km, 100km)
- 2 strike angles for some faults



Tsunami Detection, Warning and Dissemination

Tsunami simulation



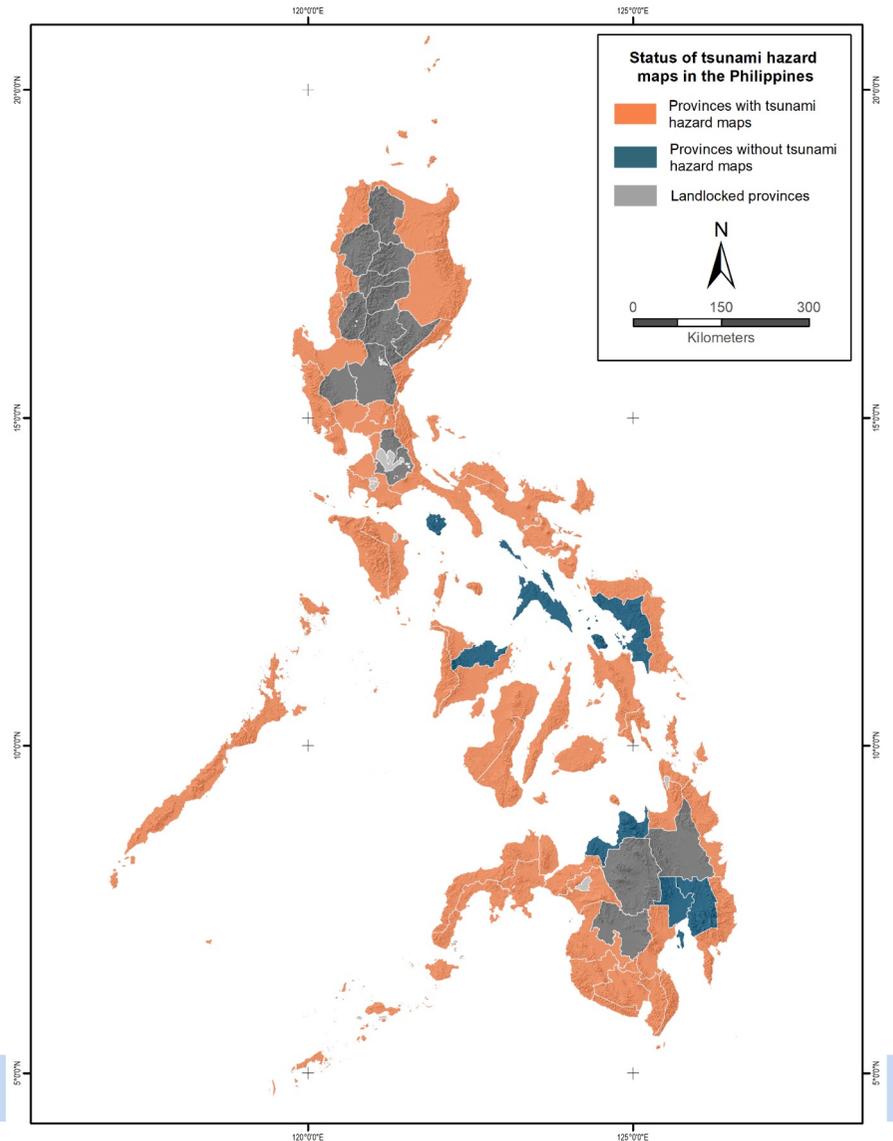
Status of Tsunami Hazard Maps in the Philippines

	No. of Provinces	Year Generated
Tsunami Prone Areas with Hazard Map	30	2007-2013
Tsunami Inundation Maps (with specific inundation depths)	29	2018-2022 as of 2024 Tsunami Hazard Maps:80 municipal scale maps
No tsunami hazard map	8	
Landlocked Provinces	15	

Coastal Assessment, Mapping, and Research of Tsunami Hazards in the Philippines (CoAsT PH)



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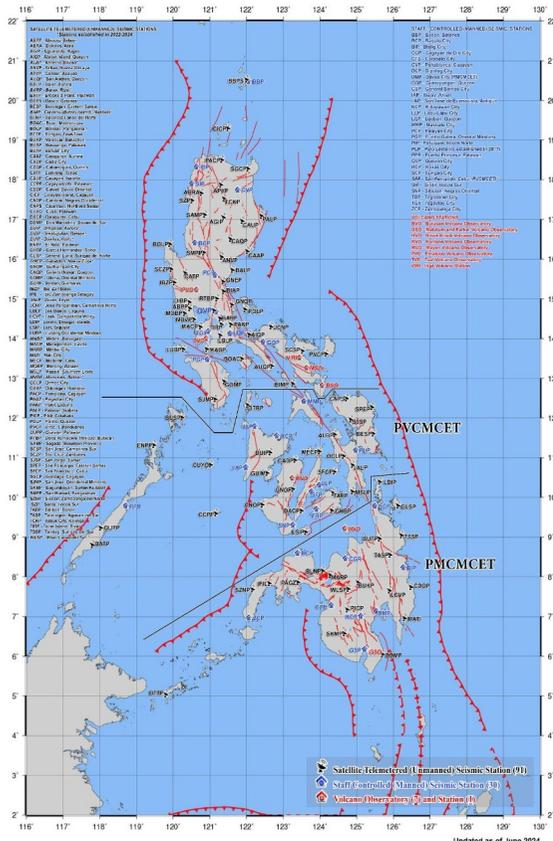


Tsunami Detection, Warning and Dissemination

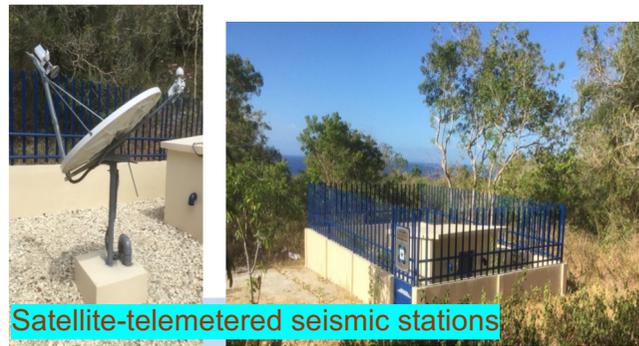
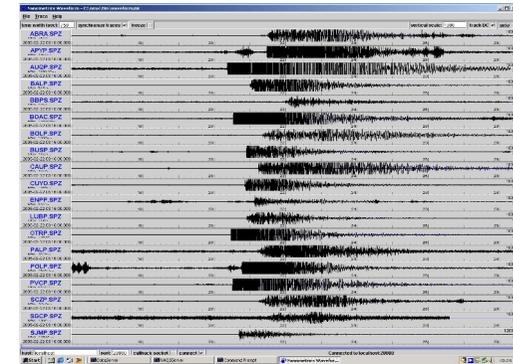
EARTHQUAKE MONITORING NETWORK



- **123-station network (seismographs)**
- 29 staff-controlled seismic stations, 94 satellite-telemetered seismic stations
- 7 volcano observatories

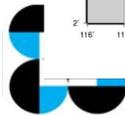


Digital Seismic Record



Satellite-telemetered seismic stations

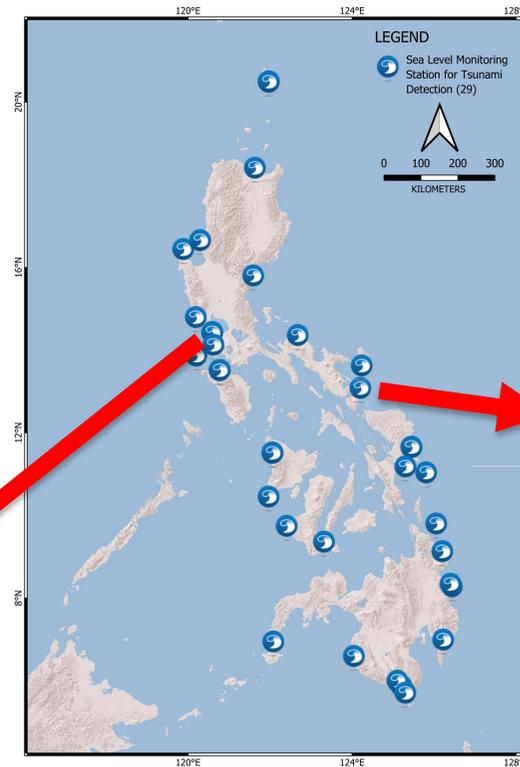
- **PMCMCET - PHIVOLCS Mindanao**
Cluster Monitoring Center for Earthquake and Tsunami
- **PVCMCET - PHIVOLCS Visayas**
Cluster Monitoring Center for Earthquake and Tsunami
- **Tagaytay City Mirror Station**



Tsunami Detection, Warning and Dissemination

TSUNAMI MONITORING NETWORK

Network	Existing
Sea Level Monitoring Station for Tsunami Detection	19 (PHIVOLCS thru JICA) 10 (PHIVOLCS thru TeWS Project) +5 (PTWC, RIMES, GLOSS)



PRIETO DIAZ ALBAY GULF SLMS (PATP)



CORREGIDOR ISLAND CAVITE SLMS (CITP)
(a) TeWS, (b) DTS and (c) TWD donated by JICA

29 Sea Level Monitoring Stations



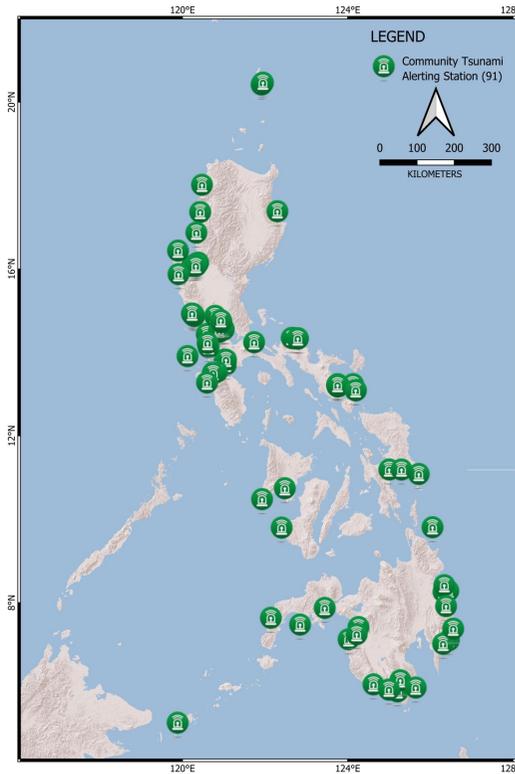
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<https://www.phivolcs.dost.gov.ph/index.php/tsunami/tsunami-monitoring>

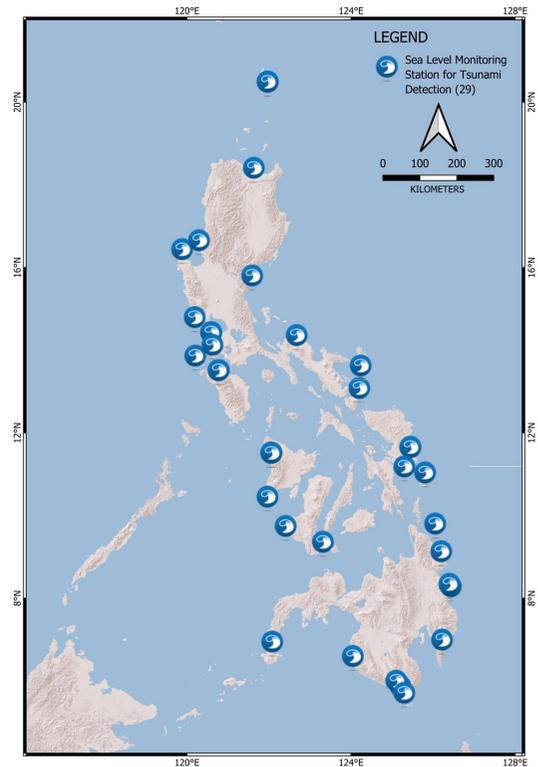
Tsunami Detection, Warning and Dissemination

TSUNAMI MONITORING NETWORK

91st Community Tsunami Alerting Stations (CTAS)



Strategic Locations
In tandem
with CTAS



29 Sea Level Monitoring Stations

San Roque Sirawai CTAS

Barangay San Roque, Sirawai, Zamboanga del Norte donated by the
Department of Science and Technology
Provincial Science and Technology Office - Zamboanga



PHILIPPINE TSUNAMI INFORMATION

Tsunami Information	Threat to the Philippines	Recommended Action for Affected Places
Advisory NO TSUNAMI THREAT	A large earthquake is generated but either (1) there is no tsunami generated by this event or (2) a tsunami was generated but will not reach the Philippines.	No evacuation needed. The advisory is issued for information purposes only.
Advisory SEA LEVEL CHANGE MONITORING	PHIVOLCS will monitor sea level changes and provide updates.	No evacuation order is in effect. Public is advised to wait and listen for updates.
Advisory MINOR SEA LEVEL DISTURBANCE	Minor sea level disturbance is expected in some coastal areas with wave heights of less than one (1) meter above the expected ocean tides.	People are advised to stay away from the beach and not to go to the coast. People whose houses are located very near the shoreline are advised to move farther inland. Owners of boats in harbors, estuaries or shallow coastal waters of the affected provinces should secure their boats and move away from the waterfront. Boats already at sea are advised to stay offshore in deep waters until further notified.
TSUNAMI WARNING	Destructive tsunami is generated with life threatening wave heights. (A destructive tsunami is expected to arrive to Philippine coastlines with wave heights of greater than one (1) meter above the expected ocean tides.)	Immediate evacuations of coastal communities that maybe affected are strongly advised. Owners of boats in harbors, estuaries or shallow coastal waters of the affected provinces should secure their boats and move away from the waterfront. Boats already at sea are advised to stay offshore in deep waters until further notified.

 The Philippine Institute of Volcanology and Seismology (PHIVOLCS) is the Tsunami Warning Focal Point of the Philippines.
PHIVOLCS Building, C.P. Garcia Avenue, U.P. Campus Diliman, Quezon City 1101
Tel. Nos.: +632 4261468 to 79; +632 9299254 Fax Nos.: +632 9271087; +632 9298366
Website: www.phivolcs.dost.gov.ph

June 2013

Tsunami Information is released if an earthquake with the potential to generate a tsunami occurred. The information is either an Advisory or Warning, a threat to the Philippines, and the recommended action for possible affected places. It also shows the earthquake parameters of the event.



Tsunami Information No.:
Date Issued: September 6, 2020
Time Issued: 11:38 PM

ADVISORY No Tsunami Threat

A strong earthquake with a preliminary magnitude of **6.4** occurred in **Mindanao, Philippines** on **06 September 2020** at 11:23 PM (Philippine Standard Time) located at **6.36 °N, 125.97 °E** with depth of 98 km. No destructive tsunami threat exists based on available data.

This is for information purposes only and there is no tsunami threat to the Philippines from this earthquake.

DOST- PHIVOLCS
GCP/DNC/WZT/BR/PPS/JBCR/RJP

<https://www.phivolcs.dost.gov.ph/index.php/tsunami/tsunami-advisory-and-warning3>



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Tsunami Detection, Warning and Dissemination

Hazard and Impact Assessment Software

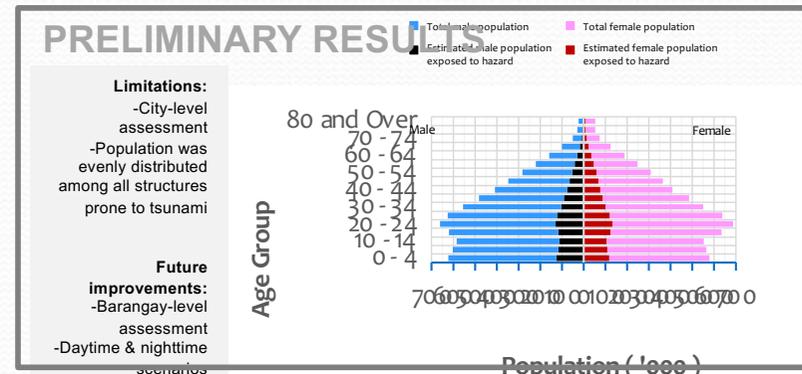
GeoAnalyticsPH

Enables analysis and visualization of the exposure of population and elements at risk to natural hazards

Generates summaries of hazards and risk assessments

Sample outputs

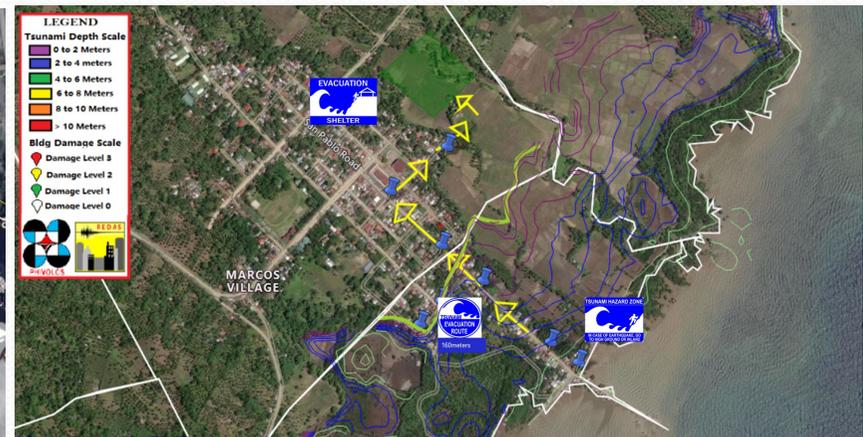
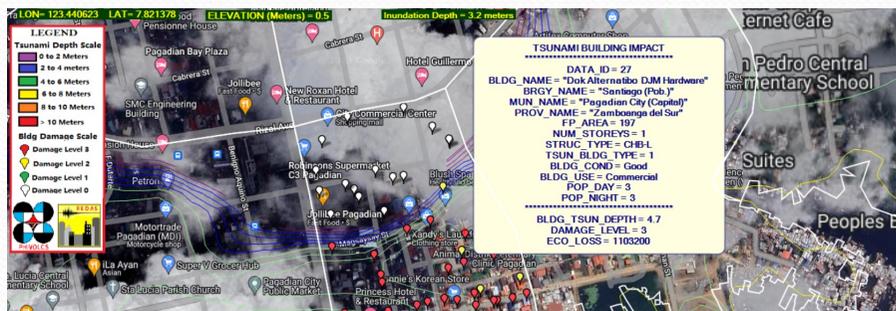
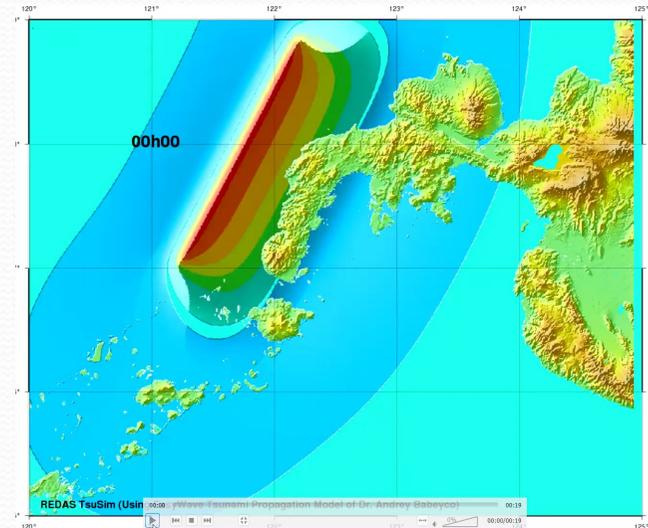
- Population Exposed in Duration per Foundation Depth
- Population at Risk per Sex and Age Group (2015)



Building Use	Number of Structures Exposed
Residential	169,925
Mixed Residential and Commercial	95,331
Commercial	14,972
Industrial	6,012
Institutional	6,116
Cultural	1,765
Infrastructure and Utilities	3,276
Recreational	658
Agriculture	810
	Total: 299,044

REDAS Tsunami Simulation Module (REDAS-TSUSIM)

REDAS Tsunami Simulation and Impact Module can simulate tsunami hazard, perform simulation and animation, compute for tsunami impacts, and plot tsunami evacuation map.



TsuSIM (Tsunami Simulation and Impact Assessment Module) which can estimate tsunami impacts.

- **Enhancing Tsunami Preparedness for Effective Community Response**

**Education,
Awareness,
Preparedness
Campaigns**

Educational materials
(print, digital, video, you
tube) seminars, drills,
press conferences,
media programs



Educational Tours



Enhancing Tsunami Preparedness for Effective Community Response

TSUNAMI SAFETY AND PREPAREDNESS



Do not stay in low-lying coastal areas after a strong earthquake. Move to higher grounds immediately.

If unusual sea conditions like rapid lowering of sea level are observed, immediately move towards high grounds. Never go down the beach to watch for a tsunami. When you see the waves, you are too close to escape it.

During the retreat of sea level, interesting signs are often revealed. Fishes may be stranded on dry land thereby attracting people to collect them. Also, sandbars and coral flats may be exposed. These scenes tempt people to flock to the shoreline thereby increasing the number of people at risk.

Stay out of danger areas until "all clear" is issued by competent authority. A tsunami is not a single wave but a series of waves.

- Conduct community-level awareness about earthquakes and tsunamis focused on natural signs of an approaching tsunami, warning and evacuation procedure.
- Pre-define high ground in your area and identify routes to get there.
- Put up signage.

Philippine Institute of Volcanology and Seismology (PHIVOLCS)
Department of Science and Technology (DOST)

WHAT IS A TSUNAMI?

A tsunami is a series of giant sea waves commonly generated by under-the-sea earthquakes and whose heights could be greater than 5 meters. It is erroneously called tidal waves and sometimes mistakenly associated with storm surges. Tsunamis can occur when the earthquake is shallow-seated and strong enough to displace parts of the seabed and disturb the mass of water over it.

Locally generated tsunamis

The coastal areas in the Philippines especially those facing the Pacific Ocean, South China Sea, Sulu Sea and Celebes Sea can be affected by tsunamis that may be generated by local earthquakes.

On 17 August 1976, a M7.9 earthquake in Moro Gulf produced tsunamis which devastated the southwest coast of Mindoro and left more than 3,000 people dead, with at least 1,000 people missing. More than 6,000 were injured and approximately 12,000 families were rendered homeless by more than 5-meter high waves.

The 15 November 1994 Mindoro Earthquake also generated tsunamis that left 75 casualties.

These tsunamis occurred within a very short time, with a risk wave reaching the shoreline nearest the epicenter, 2 to 5 minutes after the main earthquake. These tsunamis were both locally generated. There will not be enough time for warning in case of locally generated tsunamis.

Far field Tsunamis

Tsunamis may also be generated from distant locations, such as those coming from other countries bordering the Pacific Ocean like Chile, Alaska in the USA and Japan for (far field) tsunamis. The tsunami of 2 May 1960 that was generated by a strong earthquake from Chile killed 61 in Hilo, Hawaii while 20 people were reportedly killed in the Philippines. Travel times for tsunamis generated in distant locations are longer (1 to 24 hours) and will generally give enough time for warnings from the Pacific Tsunami Warning Center (PTWC) and Northwest Pacific Tsunami Advisory Center (NWPAC).

SOME NATURAL SIGNS OF AN APPROACHING LOCAL TSUNAMI

- A felt earthquake
- Unusual sea level change: sudden sea water retreat or rise
- Rumbling sound of approaching waves

Philippine Institute of Volcanology and Seismology (PHIVOLCS) Department of Science and Technology (DOST)

DEVELOPING A TSUNAMI-PREPARED COMMUNITY

Together we can save lives

In the past, people have assumed that emergency planning and preparedness is the sole responsibility of the government. But as proven in the many disasters that have occurred in recent years, positive community response to a crisis can save more lives especially if all sectors in the community have a role to play in its disaster risk mitigation efforts.

The role of national government agencies is to help the local government units and the communities by developing and implementing national programs that would capacitate the communities for disaster preparedness. These include advocacy to policy makers and planners to integrate specific disaster mitigation plans in the national development plan and generating and providing the right information that can be used towards developing a disaster-resilient nation. However, the activities at the national level alone will not save any lives if people at the community level will not use the information made available and are not prepared mentally and physically to respond. For the case of tsunami hazard after a strong earthquake, the coastal communities must take on the responsibility for their own safety.

Why tsunami preparedness?

Specific interest is put on the importance of tsunami preparedness in the community level, as there is not sufficient time for warning from the national level in case of near-shore or locally-generated tsunamis. This fact has time and again been observed after major disasters such as the 1976 August Moro Gulf and 1994 November Oriental Mindoro tsunamis. In these events, it took only 2 to 5 minutes at the earliest up to 20 minutes after the earthquakes for the tsunami waves to hit the shores of Moro Gulf and Oriental Mindoro. Residents of the coastal communities must be prepared to evacuate and move to higher ground once signs of impending tsunami are observed.

But how does a community go about preparedness and planning for tsunami? There are various steps leading to a tsunami-prepared community. Openly discussing facts about tsunami disasters will actually increase awareness and interest instead of propagating speculations that could lead to spread of rumors if the issue on tsunami hazard is avoided. Any tsunami preparedness planning need not be expensive. There is no such thing as poor community that would not be able to prepare for tsunami as many risk-reduction activities are more people-driven. Lastly, tsunamis are considered infrequent but high-impact type events, and it is important to keep in mind that tsunami disasters can destroy any progress that a community has attained in an instant.

KNOW THE HAZARD

What is a tsunami? A tsunami is a series of sea waves commonly generated by under-the-sea earthquakes and whose heights could be greater than 5 meters. For so long, it has been erroneously called tidal waves and still often mistakenly associated with storm surges (tall coastal waves due to strong winds during a storm event). Tsunamis can occur when the earthquake is shallow-seated and strong enough to vertically displace parts of the seabed and disturb the mass of water over it.

The coastal areas in the Philippines can be affected by tsunamis that may be generated by local earthquakes. Locally-generated tsunamis can occur within very short time, with the first waves reaching the nearest shoreline from the epicenter in 2 to 5 minutes after the main earthquake, before any official warnings can be transmitted from the national level to the community level.



A jeepney in South Cotabato smashed by tsunami after the 1976 August Moro Gulf Earthquake

HOW TO CONDUCT TSUNAMI DRILL

A TSUNAMI is a series of waves commonly generated by under-the-sea earthquakes, and whose heights could be greater than 5 meters. Because of this, tsunami waves can flood and inundate coastal areas.

DESIGNING A TSUNAMI EVACUATION PLAN

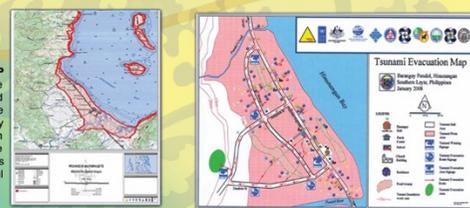
- Step 1** Acquire a tsunami hazard map
Acquire detailed community map
- Step 2** Identify safe evacuation areas
The following are possible bases for site selection:
(a) Should be outside identified tsunami hazard zone.
(b) Can be reached by foot within the shortest possible time.
(c) The total area of the site can hold an entire community (or certain percentage of population of the community if several sites are selected) and
(d) Can be easily identified by residents (examples: a prominent hill, a school, an open park, among others).
- Step 3** Recommend evacuation routes
The Tsunami Evacuation Map should show the best routes (safest, shortest/fastest way) for people to use in case of emergencies.
The following are some characteristics of ideal evacuation routes:
(a) wide streets, if possible, no bridges;
(b) away from landslide-prone areas and
(c) limited overhead power lines and similar hazards.
While in the process of designing the plan, it is best to walk along routes to identify hazards and check on ground conditions that may not be obvious on maps.
- Step 4** Discuss with community leaders and residents to put up three kinds of signage: a) tsunami prone area, b) tsunami evacuation route, and c) tsunami evacuation site
Create draft of tsunami evacuation plan / working map showing tsunami evacuation zone, identified evacuation areas and routes.
Organize a small group workshop with community leaders and residents.
Discuss draft map and seek comments and inputs to improve map.
- Step 5** Develop complete version of the map
Finalize map from the inputs of community members and leaders.
Evacuation maps should be simple and easy to read, and should include essential information only such as:
(a) tsunami hazard zone;
(b) safe evacuation area;
(c) recommended evacuation routes; and
(d) local landmarks to help people orient themselves on the map.

After coming up with the final tsunami evacuation plan, the **Emergency Disaster Risk Reduction and Management Committee (EDRMC)** should take the lead in implementing the plan (e.g. assign specific roles to each member of the community, and conduct regular tsunami drills).

DOST
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FAX: (053) 261-6162, (053) 377-2671
Website: www.phivolcs.dost.gov.ph
Printed November 2013

PHASES OF A TSUNAMI DRILL

- 1 ALARM PHASE:**
1 minute alarm signifying a strong earthquake
- 2 REACTION:**
People do the response procedure during the earthquake such as the "duck, cover and hold"
- 3 EVACUATION PHASE:**
Residents quickly move out of their houses to go to designated evacuation areas
- 4 ASSEMBLY PHASE:**
Families from the same area or paroks should group together to better facilitate headcount/ accounting of residents
- 5 HEADCOUNT PHASE:**
How many are expected to arrive based on barangay population information?
- 6 DRILL TERMINATION:**
The drill master should inform the participants that the drill has ended
- 7 POST-DRILL EVALUATION:**
Assessing the conduct of drill is important for improving future activities



Tsunami Evacuation Map of Baguio, Pinaric, Hinunangan, Southern Leyte, January 2008

A TSUNAMI EVACUATION MAP shows areas identified within hazard zones and areas which are safe. This map provides direction to identified evacuation sites.



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Disaster Risk Communication in multilingual country



Local Language Versions Ilocano, Bicolano, Maguindanaoan, Cebuano, Ilonggo (2006-2007)



In local languages:

- Ilocano
 - Tagalog
 - Kapampangan
 - Cebuano-Visayas
 - Cebuano-Mindanao
 - Hiligaynon
- (2024-2025)

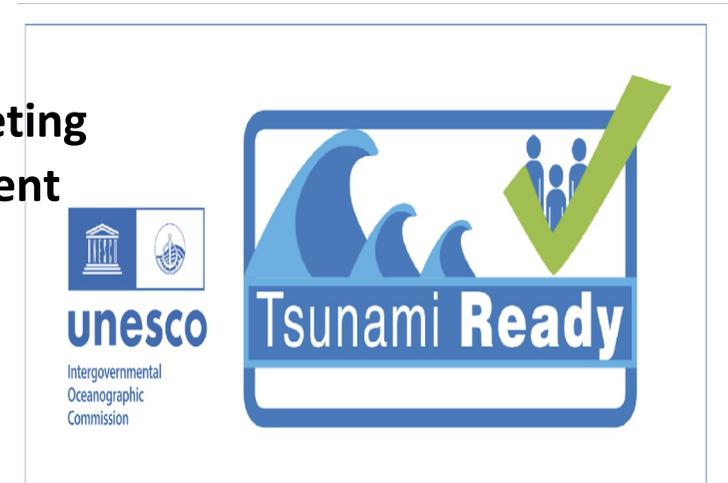


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2022 onwards

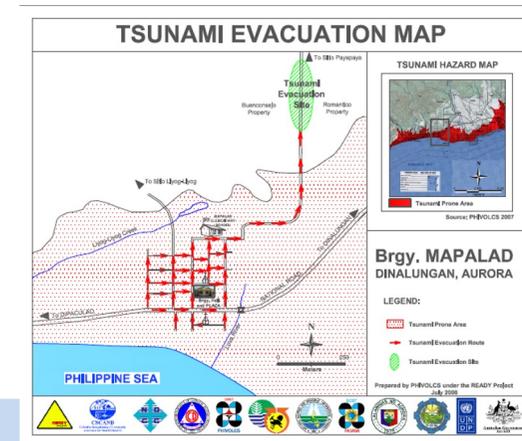
TSUNAMI READY PHILIPPINES – in coordination with
NDRRMC, OCD

- December 2022 - Letter to OCD, for exploratory meeting
- March 2023 exploratory meeting for the establishment of National Tsunami Ready Board (NTRB)
 - Ways forward:
 - List of activities the 12 indicators of Tsunami Ready Recognition Program drafted
 - OCD-PDPS to present to heads the need to establish NTRB
- 2023: DEVELOPING A TSUNAMI-READY COMMUNITY: BRGY. CONCORDIA, BOLINAO, PANGASINAN
- -2024: DEVELOPING A TSUNAMI-READY COMMUNITY: CALATAGAN, BATANGAS
- 2025- draft creation of NTRRB



Establish community-based early warning system for tsunami and conduct tsunami preparedness drills in communities

- Evacuation plans and maps
- Signage installation
- IEC seminars
- Community Drills



Tsunami Markers

Local government initiated in collaboration and technical support from PHIVOLCS



For the 1994 Mindoro Tsunami



For the 1976 Moro Gulf Tsunami



For the 1970 Baler Tsunami





WORLD TSUNAMI AWARENESS DAY

5 NOVEMBER

Since 2016, the Philippines is one with the whole world in commemorating the World Tsunami Awareness Day



Philippine Institute... was live.

7h · 🌐

WORLD TSUNAMI AWARENESS DAY

#TsunamiReadyPH
#wtad2024
#tsunamiready
#HandaAngMayAlam
#gettothehighground



WTAD 2024



Philippine Institute of... was live.

9h · 🌐

MORE RUN PHOTOS

More than 1,600 participa... See more



Philippine Institute... was live.

8h · 🌐

ATM: Ribbon-cutting and opening of exhibit in observance of the World Tsunami Awareness Day



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Philippine Institute of Volcanology and Seismology

Short-term secondment of international staff from NTWCs of WG-SCS Member States to the SCSTAC.

South China Sea Tsunami Advisory Center,
Beijing, China
24 July- 23 September 2024 (2 months)



THANK YOU



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Philippine Institute of Volcanology and Seismology