MINISTRY OF NATURAL RESOURCES AND ENVIRONMENTAL SUSTAINABILITY

MALAYSIAN METEOROLOGICAL DEPARTMENT

Thirty-first Session of the Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (ICG/PTWS-XXXI)

7-11 APRIL 2025 | BEIJING CHINA

National Progress Report

MALAYSIAN NATIONAL TSUNAMI EARLY WARNING SYSTEM (MNTEWS)

BY AMBUN DINDANG | MALAYSIA METEOROLOGICAL DEPARTMENT

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INTRODUCTION

MALAYSIAN NATIONAL TSUNAMI EARLY WARNING SYSTEM

INTRODUCTION

MALAYSIAN NATIONAL TSUNAMI EARLY WARNING SYSTEM (MNTEWS)

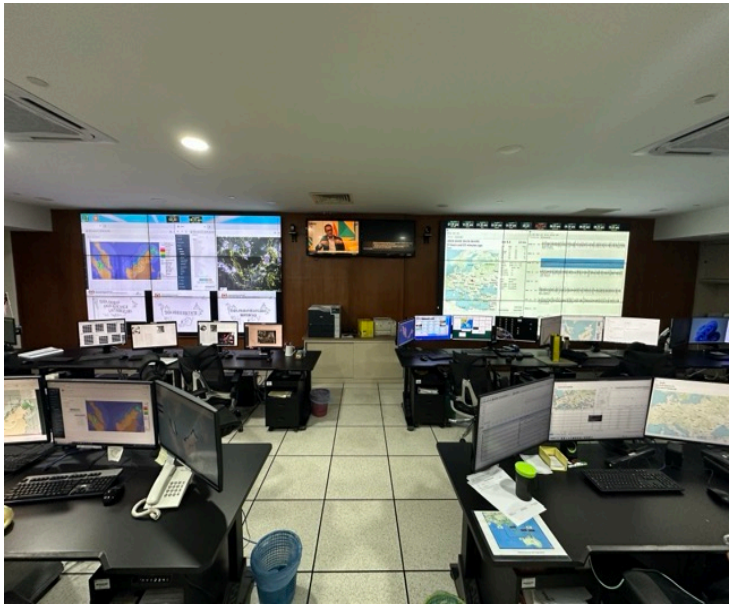
MALAYSIA NATIONAL TSUNAMI EARLY WARNING SYSTEM (MNTEWS)

Establishment:
MNTEWS was established after the occurrence of destructive tele-tsunami in off West Coast of Northern Sumatera, Indonesia on 26 December 2004 at 00:58:53 UTC.

Objective:
To enable the provision of timely and effective early warning to the public in the occurrence of a tsunami generated event over the Indian Ocean, South China Sea, Sulu Sea or the Pacific Ocean that will affect Malaysia.

Operation:
MNTEWS operates continuously 24 hours x 7 daily with two 12 hours per shift (8am-8pm and 8pm-8am next day). Every shift manned by 10 officers.

Dissemination:
Earthquake information and tsunami alerts are disseminated through electronic and social media platforms (TV, Radio, Facebook, Instagram, X), website, mobile application (myGempa), and MET TV you tube within 8 minutes after detection.



MAIN COMPONENT

MALAYSIAN NATIONAL TSUNAMI EARLY WARNING SYSTEM (MNTEWS)

MNTEWS

DATA COLLECTION COMPONENT

DATA

DATA PROCESSING AND DECISION COMPONENTS

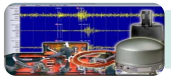
PROCESS

DISSEMINATION AND RESPONSE COMPONENTS

OUTPUT

8 MINUTE KPI

REAL TIME OBSERVATION (24/7)


•SEISMIC NETWORK (EARTHQUAKE)


•TIDAL GAUGE NETWORK (TSUNAMI)

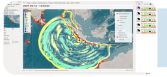

•TSUNAMI COASTAL CAMERA


•PTWC/JMA/RTSP/SCS


•GSN/IRIS – INTERNATIONAL LINKAGE

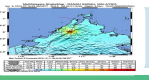
APPLICATION AND SOFTWARE


•**SEISCOMP** - EARTHQUAKE


•**TOAST** – TSUNAMI MODELLING


•**ADMIS-DSS** – DECISION SUPPORT


•**IDMS** - DATABASE


•**SHAKEMAP –** SHAKING INTENSITY

REDUCE TSUNAMI IMPACT


•SMS, EMAIL DAN FAX


•MYGEMPA/MET WEB/EMSC

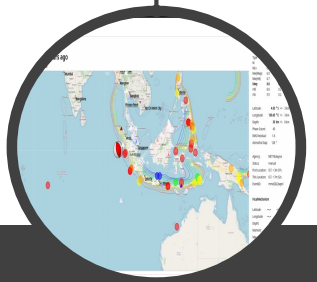

•TSUNAMI SIREN NETWORK


•PUBLIC AWARENESS


•SOCIAL AND MASS MEDIA

EARTHQUAKE AND TSUNAMI DETECTION

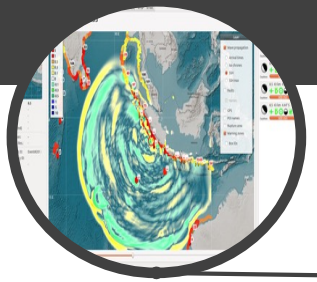
MALAYSIAN NATIONAL TSUNAMI EARLY WARNING SYSTEM (MNTEWS)



SeisComP

Seismological Communication Processor Software for real-time seismic data acquisition, storage, distribution and analysis

+



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TSUNAMI EARLY WARNING

MALAYSIAN NATIONAL TSUNAMI EARLY WARNING SYSTEM

TO ENABLE THE PROVISION OF TIMELY AND EFFECTIVE EARLY WARNING TO THE PUBLIC IN THE OCCURRENCE OF A TSUNAMI GENERATED OVER THE INDIAN OCEAN, SOUTH CHINA SEA, SULU SEA OR THE PACIFIC OCEAN THAT WILL AFFECT MALAYSIA.

TOAST (Tsunami Observation And Simulation Terminal)

Software for tsunami simulation and verification providing a quick hazard assessment. Tsunami evaluation and decision support software

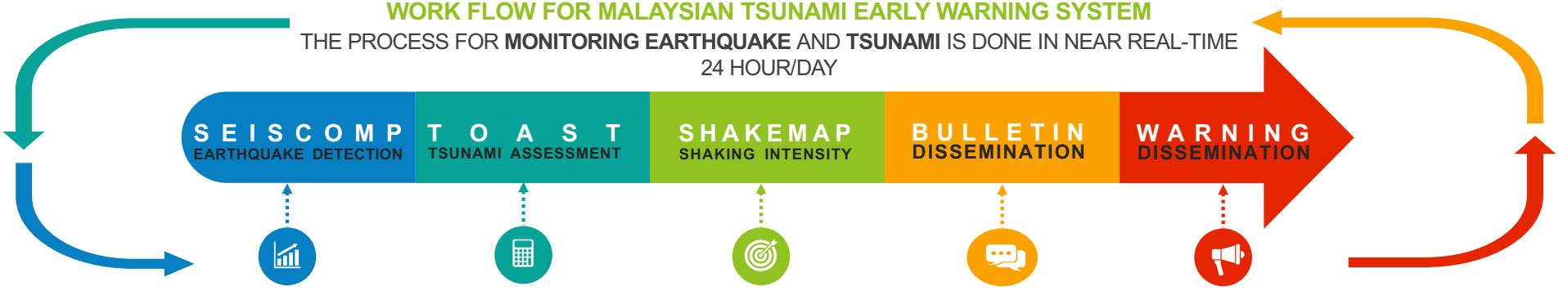
W O R K F L O W

MALAYSIAN NATIONAL TSUNAMI EARLY WARNING SYSTEM

24 HOUR MONITORING

WORK FLOW FOR MALAYSIAN TSUNAMI EARLY WARNING SYSTEM

THE PROCESS FOR **MONITORING EARTHQUAKE** AND **TSUNAMI** IS DONE IN NEAR REAL-TIME 24 HOUR/DAY



SEISCOMP
Provide seismic data acquisition, monitoring, detection and analysis of an earthquake

TOAST
Analysis and evaluation of tsunamigenic potential

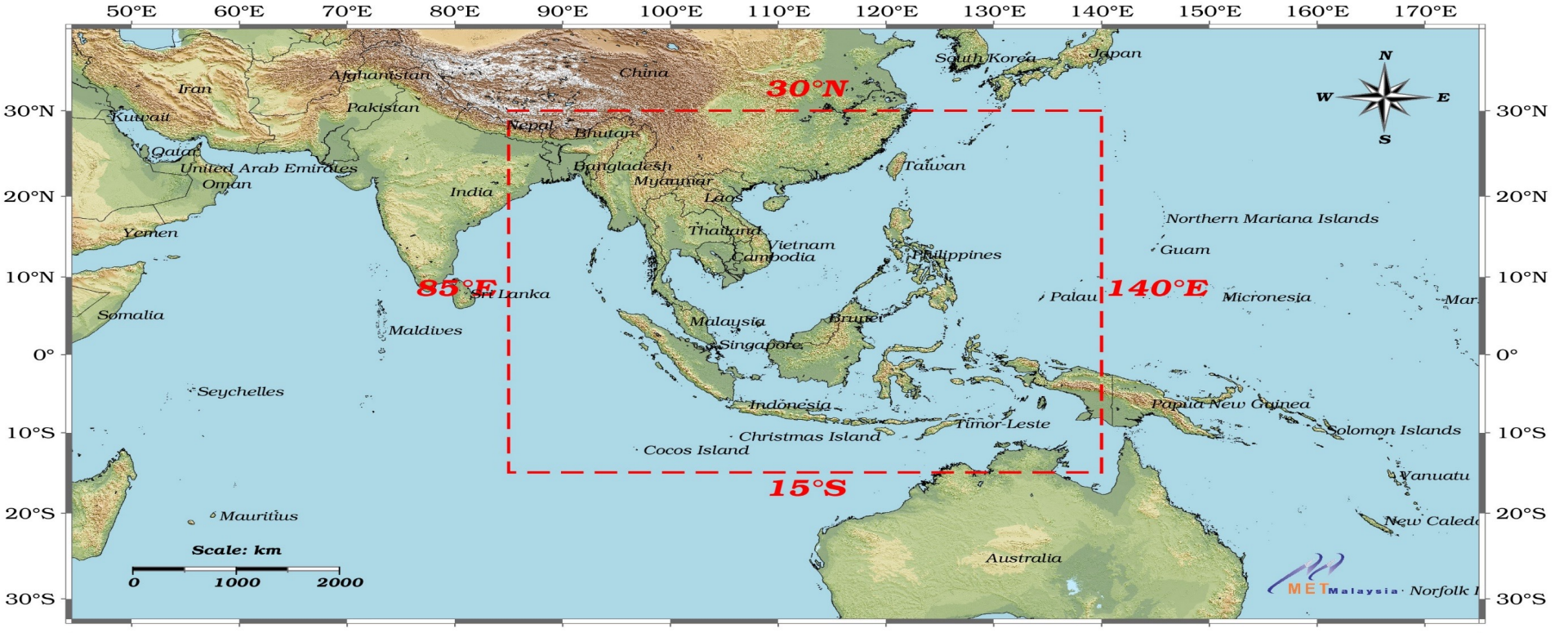
SHAKEMAP
Provide near-real-time analysis of ground motion and shaking intensity after the detection of a significant/local earthquake.

ADMIS
Earthquake/ Tsunami bulletin will be disseminated within **8 minute** after the detection of an earthquake by SeisComP

WARNING
- Warning/Advisory/Termination will be issued when necessary (SOP).
- Tsunami Siren will be triggered based on the tsunami impact location when necessary (SOP).

AREA OF REPORTING (AOR)

MALAYSIAN NATIONAL TSUNAMI EARLY WARNING SYSTEM



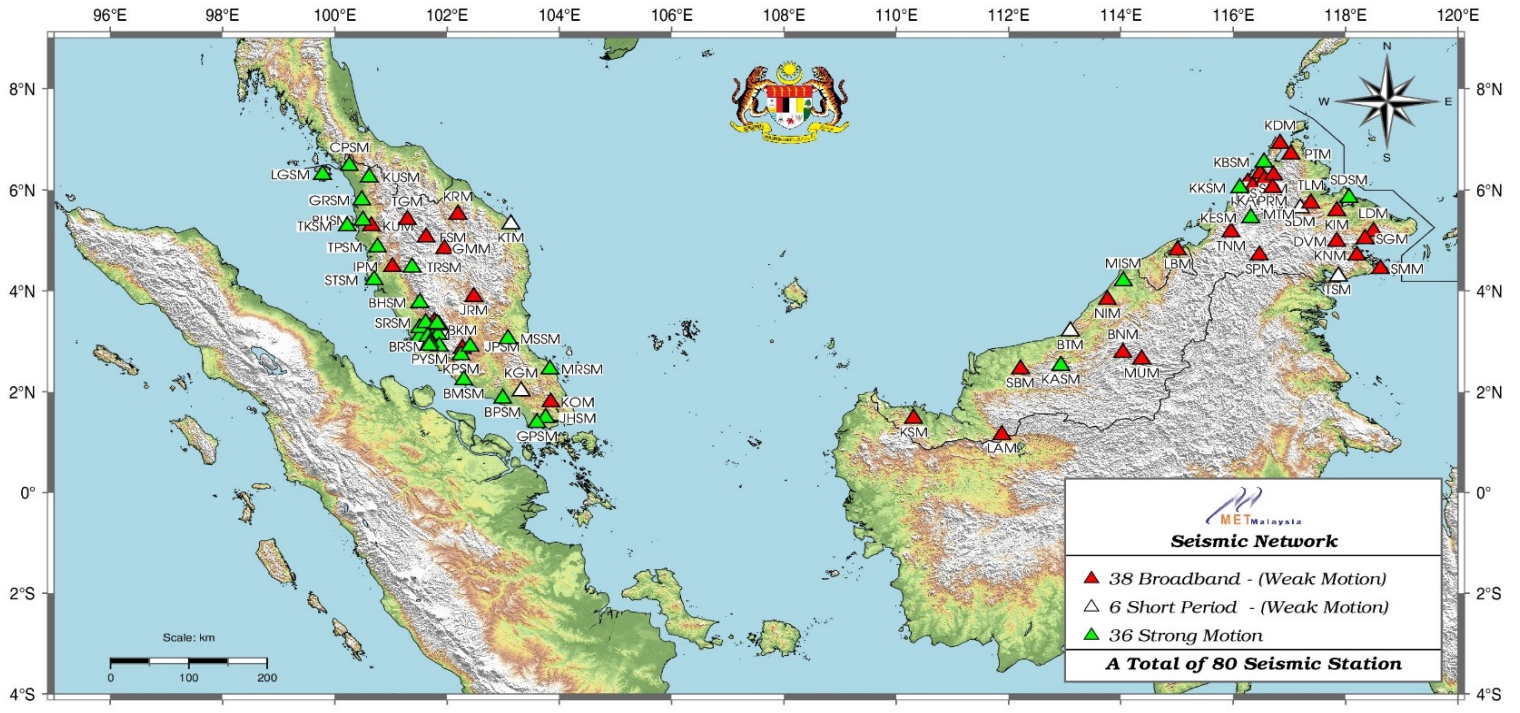
LEGEND
— Area Of Reporting (AOR) For Earthquake Information and Tsunami Warning
Generate at 2024-07-30 06:19:14 UTC

DATA COLLECTION COMPONENT

MALAYSIAN NATIONAL TSUNAMI EARLY WARNING SYSTEM

S E I S M I C N E T W O R K

M A L A Y S I A N N A T I O N A L T S U N A M I E A R L Y W A R N I N G S Y S T E M



LOCATION FACTS

41 IN PENINSULAR MALAYSIA
SEISMIC STATION

28 IN SABAH
SEISMIC STATION

10 IN SARAWAK
SEISMIC STATION

FACTS FOR SEISMIC STATION

A **SEISMIC STATION** CONSISTS OF SEISMOMETER TO MEASURED GROUND MOTION VELOCITY, ACCELEROMETER TO MEASURED GROUND MOTION ACCELERATION AND DATA LOGGER FOR DATA RECORDER.

80 SEISMOLOGICAL STATION
IN TOTAL

41 *WEAK MOTION (3C)*
SEISMIC STATION

39 *STRONG MOTION (1C)*
SEISMIC STATION

TIMELINE FOR MALAYSIAN SEISMIC NETWORK

MALAYSIAN NATIONAL TSUNAMI EARLY WARNING SYSTEM

1979 — **6 SEISMIC STATION**
First six (6) Seismic Station for Malaysia started in 1979
[UNDP Project - A Regional Seismological Programmed For South East Asia]

2003 — **12 SEISMIC STATION**
Expanding the current Seismic Network with addition of 6 Seismic Station
[Satellite Seismograph Project]

2006 — **14 SEISMIC STATION**
Two (2) additional Seismic Station added after the 2004 Tsunamis.
[SAATNM Project]

2008 — **15 SEISMIC STATION**
One (1) Seismic Station added in Putrajaya
[National Seismic Research Project]

2009 — **29 SEISMIC STATION**
Expanding the current Seismic Network with addition of 14 Seismic Station
[RMKe-9 (Malaysian Plan)]

2012 — **42 SEISMIC STATION**
Additional 13 Seismic Station
[RMKe-9 (Malaysian Plan)]

2015 — **62 SEISMIC STATION**
Additional 20 Seismic Station
[RMKe-10 (Malaysian Plan)]

2017 — **77 SEISMIC STATION**
Additional 15 Seismic Station
[RMKe-11 (Malaysian Plan)]

2020 — **80 SEISMIC STATION**
Additional 3 Seismic Station
[RMKe-11 RP4 (Malaysian Plan)]

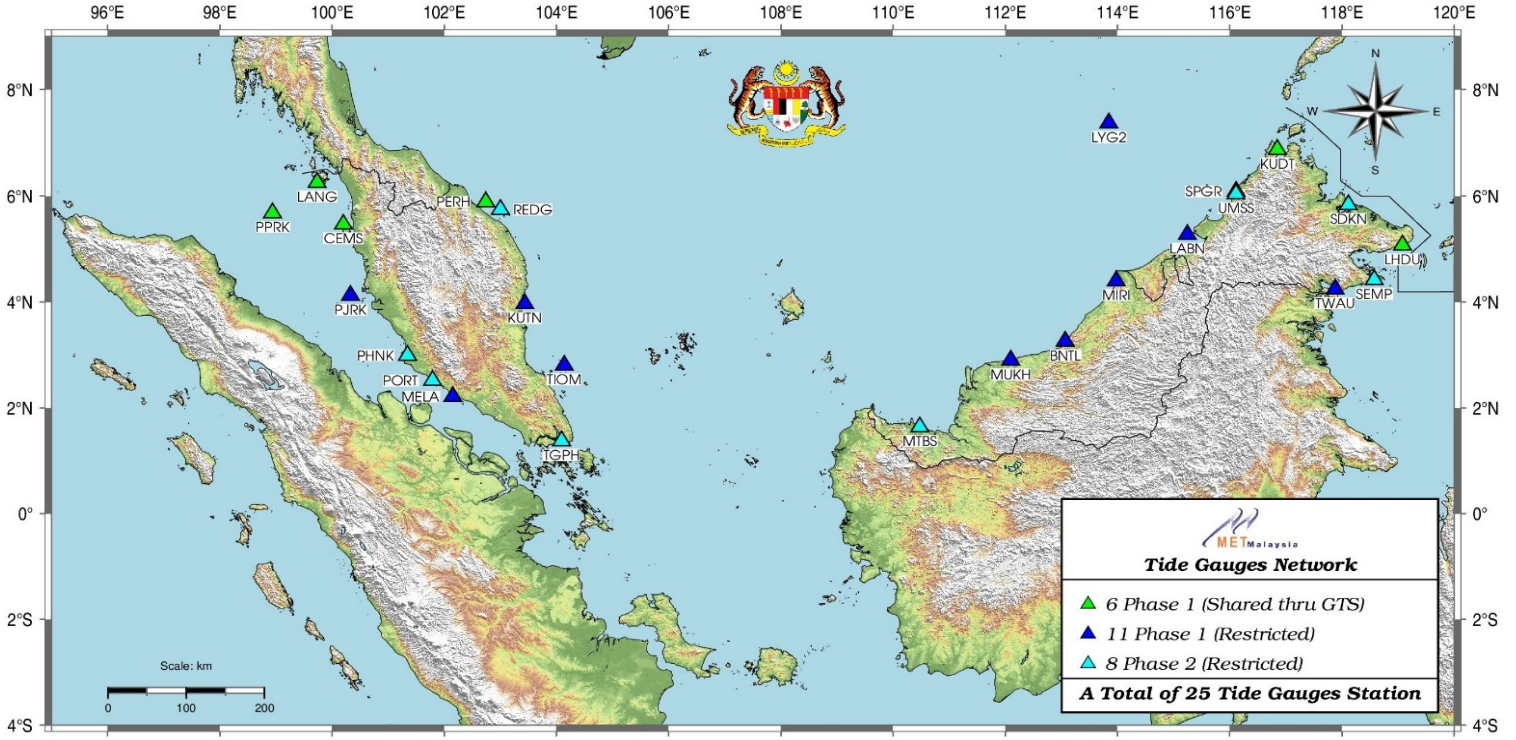
PRESENT — ***80 Seismic Station***





TIDAL GAUGES NETWORK

MALAYSIAN NATIONAL TSUNAMI EARLY WARNING SYSTEM



LOCATION FACTS

12 IN PENINSULAR MALAYSIA
TIDAL GAUGES

9 IN SABAH
TIDAL GAUGES

4 IN SARAWAK
TIDAL GAUGES

6 SHARED THRU GTS
DATA EXCHANGE

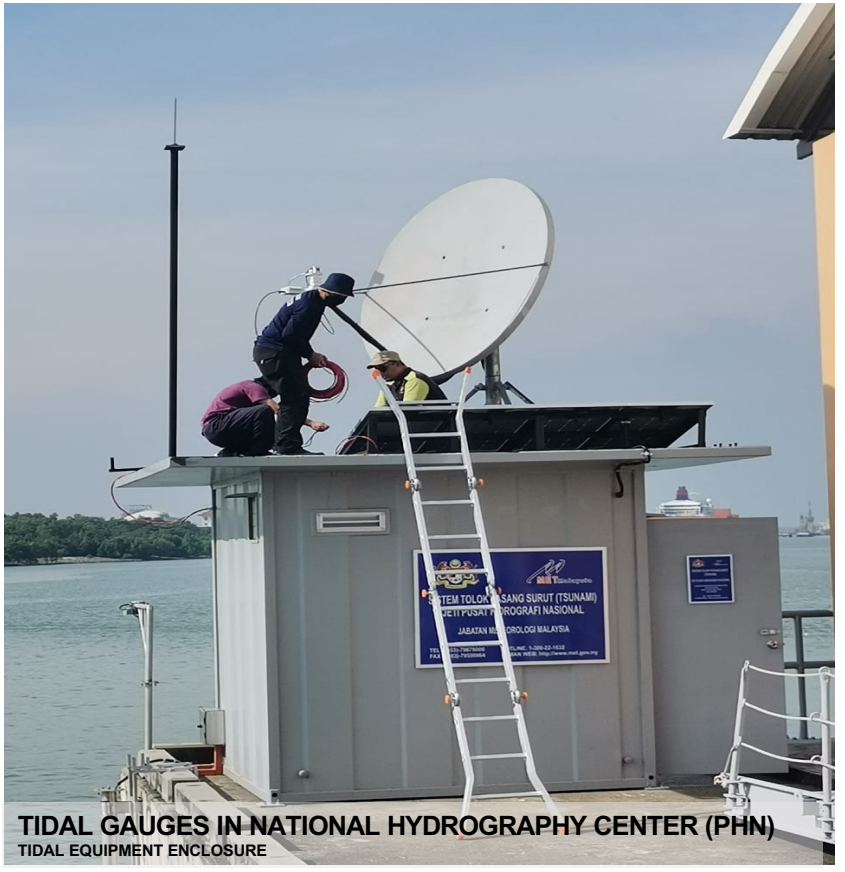
FACTS FOR TIDAL GAUGE

A **tide gauge** is a device used to measure the change in sea level relative to a vertical datum.

25 TIDE GAUGE STATION
IN TOTAL

TIMELINE FOR TIDAL GAUGES NETWORK

MALAYSIAN NATIONAL TSUNAMI EARLY WARNING SYSTEM



TIDAL GAUGES IN NATIONAL HYDROGRAPHY CENTER (PHN)

TIDAL EQUIPMENT ENCLOSURE

2006

7 TIDAL GAUGES

The first Seven (7) tidal gauge for tsunami monitoring installed

[SAATNM Project]

2010

7 TIDAL GAUGES (UPGRADES)

Upgrading existing (6) tidal gauge

[SAATNM Project]

2013

17 TIDAL GAUGES

Additional 10 tidal gauges installed

[RMKe-9 (Malaysian Plan)]

2021

25 TIDAL GAUGES

Additional 8 tidal gauges installed

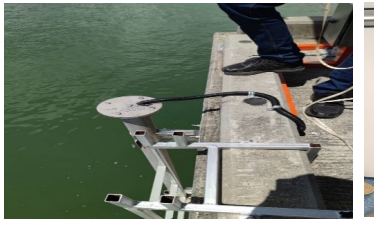
[RMKe-11 (Malaysian Plan)]

2024

25 TIDAL GAUGES

Upgrading existing 17 First and Second Phase Tidal Gauge

[RMKe-12 RP4 (Malaysian Plan)]



DATA PROCESSING COMPONENT

MALAYSIAN NATIONAL TSUNAMI EARLY WARNING SYSTEM

SEISMIC PROCESSING SOFTWARE

MALAYSIAN NATIONAL TSUNAMI EARLY WARNING SYSTEM

SeisComP 6

DATA
- Data Acquisition
- Waveform Archiving
- Waveform Distribution
- Data Quality Control
- Data Recording
- Real Time data exchange

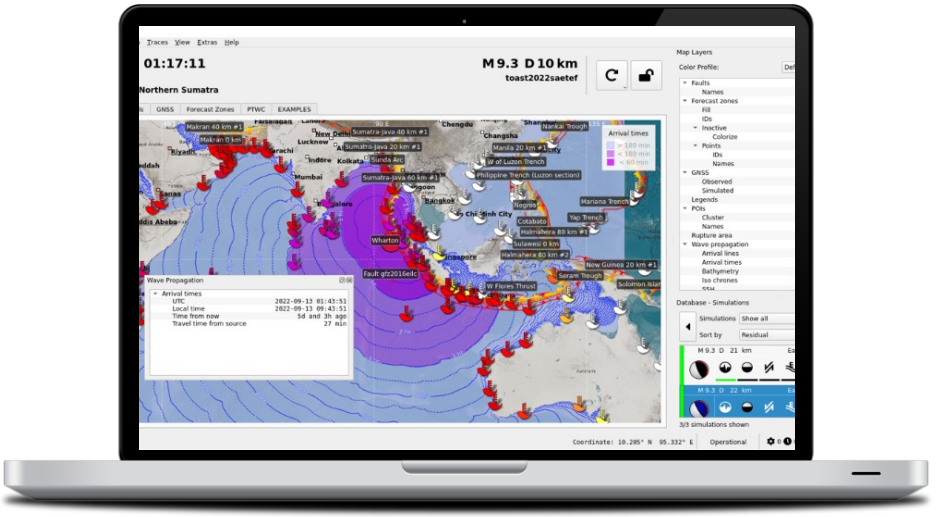
PROCESSING
- Real-time data processing
- Automatic Earthquake Detection and location
- Automatic and interactive magnitude calculation

ANALYSIS
- Interactive event detection, analysis and location
- Interactive determination of focal mechanisms
- Manual Analysis

GRAPHICAL USER INTERFACE
- Visualization of waveform and situation status
- Event Visualization
- State-of-health monitoring
- Simplicity and speed

TSUNAMI OBSERVATION AND SIMULATION TERMINAL

M A L A Y S I A N N A T I O N A L T S U N A M I E A R L Y W A R N I N G S Y S T E M



Tsunami Observation and Simulation Terminal (TOAST)

Tsunami simulation and comparison with observations.

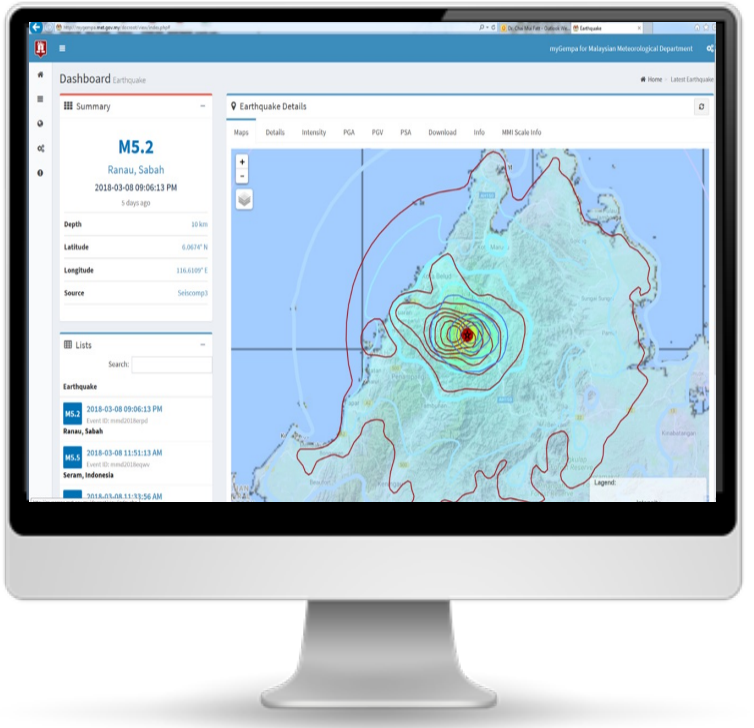
Connectivity to SeisComP with On-the-fly simulation and calculation of Sea Surface Height (SSH), arrival times etc.

Automatic and interactive generation of rupture area and aggregation of scenarios to determine overall worst case.

Generation of bulletins based on predefined templates.

S H A K E M A P S Y S T E M

MALAYSIAN NATIONAL TSUNAMI EARLY WARNING SYSTEM

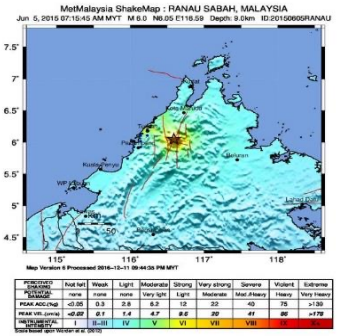


http://mygempa.met.gov.my

MYGEMPA – MET Malaysia SHAKEMAP

MET Malaysia ShakeMap was developed based on the USGS ShakeMap. The main purpose of MET Malaysia **ShakeMaps** is to provide a near-real-time maps of ground motion and shaking intensity following significant earthquakes.

PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<.17	.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+



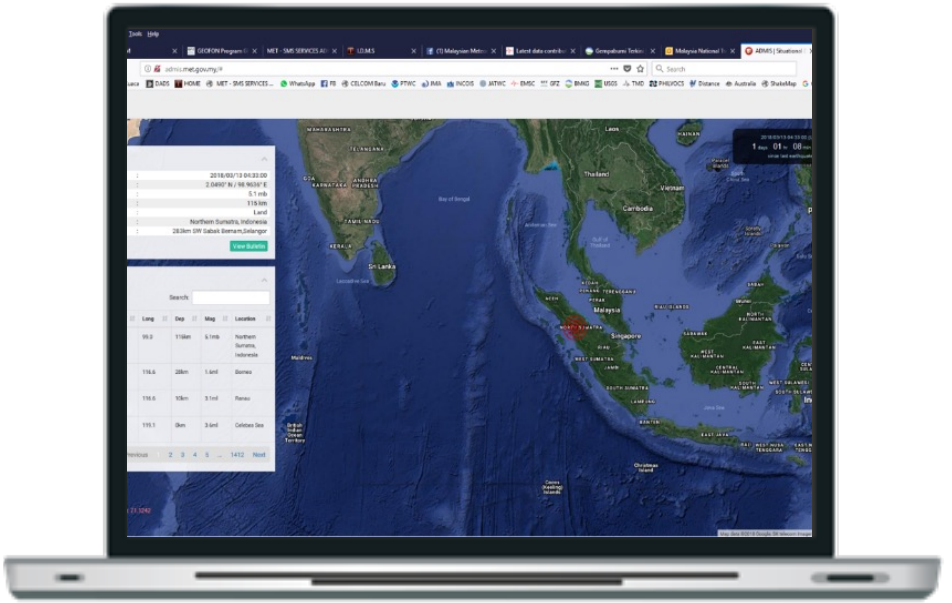
INTENSITY MAP
5 Jun 2015 07:15:45 AM MYT
M6.0
6.05 °North 116.59 °East
Ranau, Sabah, Malaysia
Depth 9.0 km

DISSEMINATION AND RESPONSE COMPONENT

MALAYSIAN NATIONAL TSUNAMI EARLY WARNING SYSTEM

DECISION SUPPORT SYSTEM (ADMIS)

MALAYSIAN NATIONAL TSUNAMI EARLY WARNING SYSTEM



The main purpose for this system is to come up with a decision proposal based on the current MET Malaysia Standard Operating Procedure.

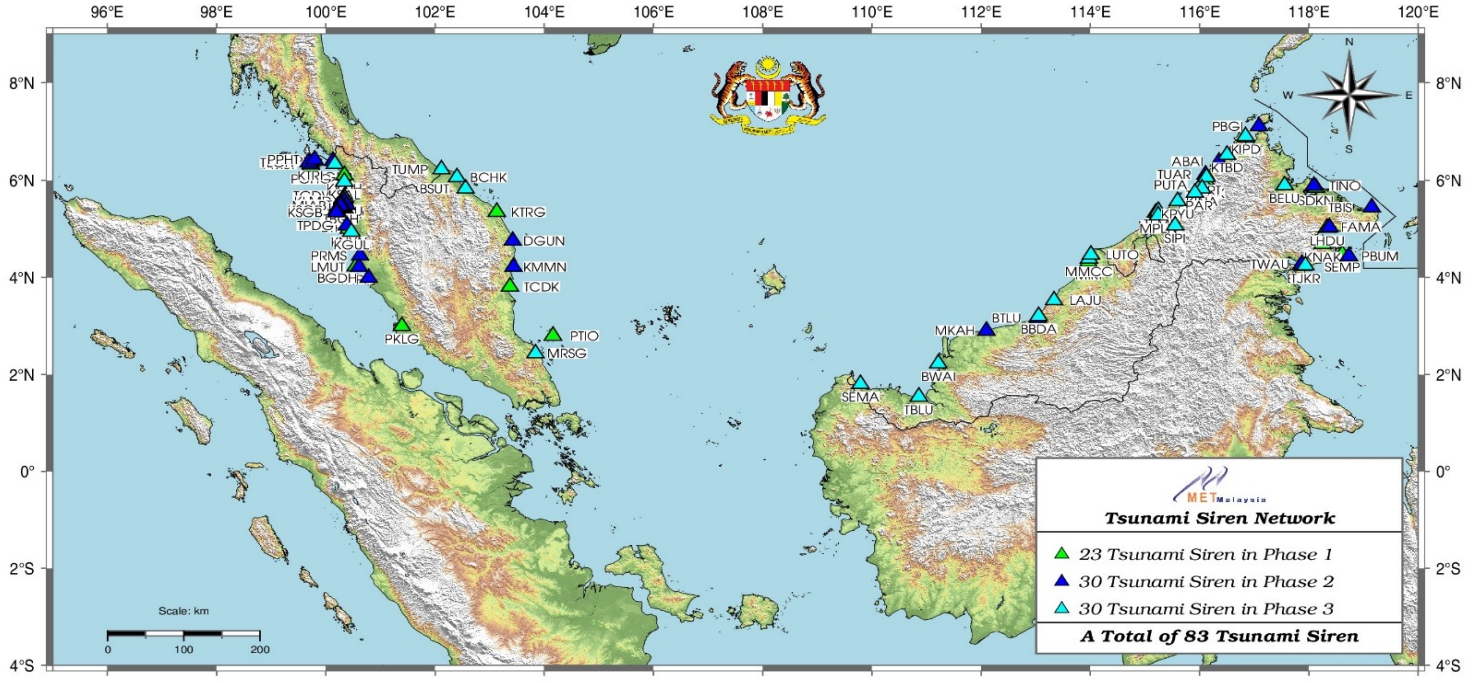
Reducing human mistake with automatic earthquake and tsunami bulletin generation.

Earthquake and Tsunami Bulletin Information can be disseminate thru sms, email, fax, web and social media.

Integration with existing pre-computed tsunami numerical database to predict the tsunami arrival time and height based on pre-defined focal point.

TSUNAMI SIREN NETWORK

MALAYSIAN NATIONAL TSUNAMI EARLY WARNING SYSTEM

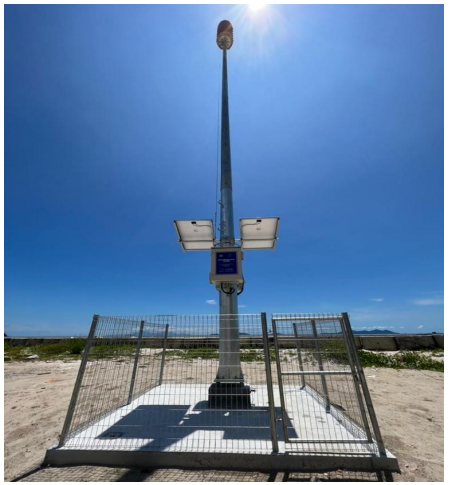


LOCATION FACTS

43 IN PENINSULAR MALAYSIA
TSUNAMI SIREN

10 IN SARAWAK
TSUNAMI SIREN

30 IN SABAH/LABUAN
TSUNAMI SIREN



80 TSUNAMI SIREN
IN TOTAL

FACTS FOR TSUNAMI SIREN

Tsunami sirens are intended to be used as a mechanism to trigger a warning for community when a distant tsunami approaches the shoreline. The primary focus of the sirens is to warn and evacuate those who are inside inundation zone or those who are at the beach

TIMELINE FOR TSUNAMI SIREN

MALAYSIAN NATIONAL TSUNAMI EARLY WARNING SYSTEM

TSUNAMI SIREN

PHASE 3 TSUNAMI SIREN CONFIGURATION

53 TSUNAMI SIREN

Second Phase

Additional 30 Tsunami Siren Installed

[RMKe-9 (Malaysian Plan)]

83 TSUNAMI SIREN

First Phase (Upgrading)

23 Unit Tsunami Siren will be upgrade to Phase 3 Configuration

[RMKe-12 RP4 (Malaysian Plan)]

2006 — 2013 — 2020 — 2024

23 TSUNAMI SIREN

First Phase

23 Tsunami Siren Installed

[SAATNM Project]

83 TSUNAMI SIREN

Third Phase

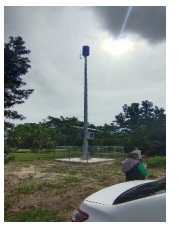
Additional 30 Tsunami Siren installed

[RMKe-11 (Malaysian Plan)]



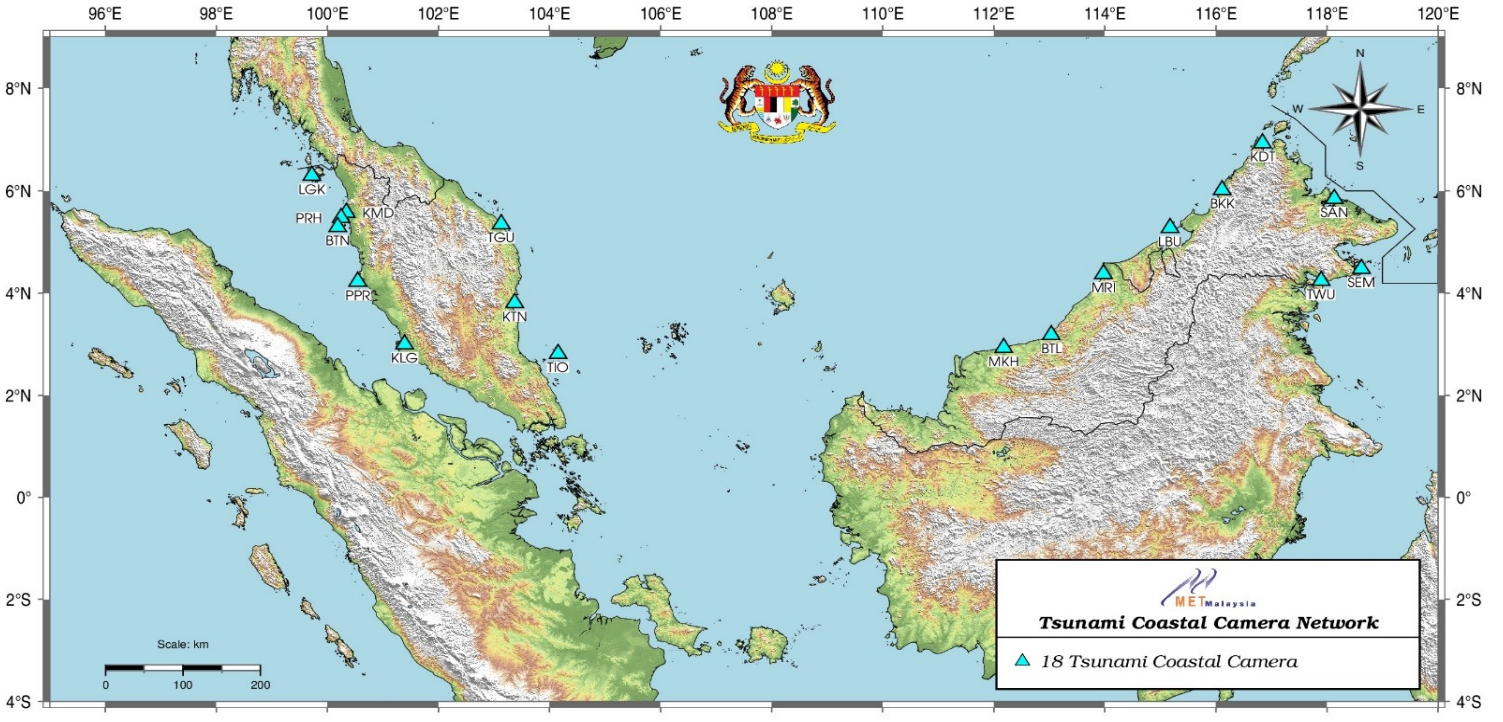






TSUNAMI COASTAL CAMERA NETWORK

MALAYSIAN NATIONAL TSUNAMI EARLY WARNING SYSTEM



LOCATION FACTS

9 IN PENINSULAR MALAYSIA
TSUNAMI COASTAL CAMERA

6 IN SABAH
TSUNAMI COASTAL CAMERA

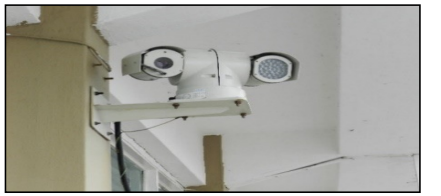
3 IN SARAWAK
TSUNAMI COASTAL CAMERA

2006 → 2024

18 TSUNAMI CAEMERA

18Tsunami Camera Installed

[SAATNM project]



FACTS FOR TSUNAMI COSTAL CAMERA

The tsunami coastal camera are intended to be used as a visual aid to verify the arrival of tsunami at coastal areas

18 TSUNAMI COASTAL CAMERA IN TOTAL

PUBLIC AWARENESS AND TSUNAMI DRILL

MALAYSIAN NATIONAL TSUNAMI EARLY WARNING SYSTEM

PUBLIC AWARENESS AND TSUNAMI DRILL

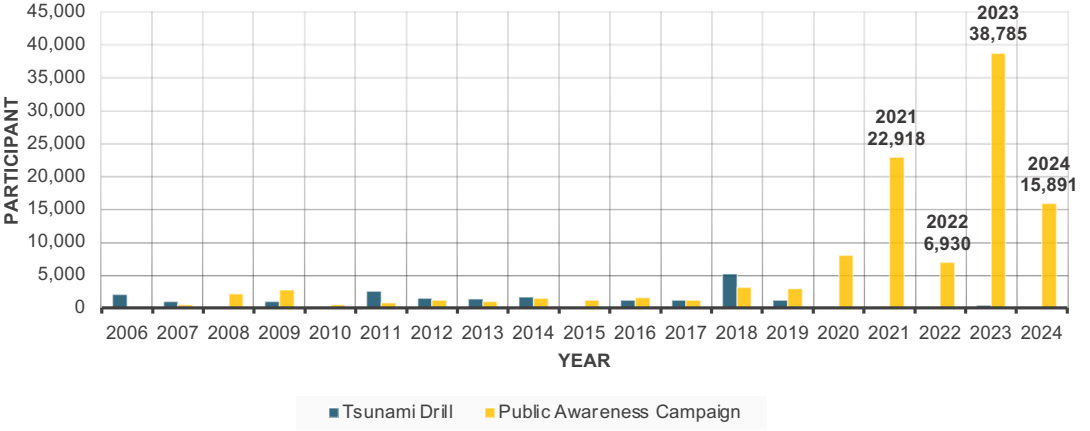
MALAYSIAN NATIONAL TSUNAMI EARLY WARNING SYSTEM

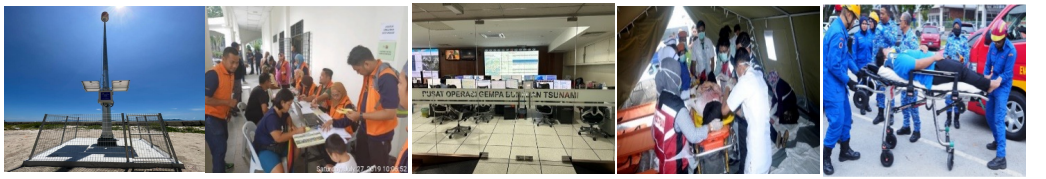
Year	Tsunami Drill		Public Awareness Campaign	
	Series	Participation	Series	Participation
2006	1	2,000	0	0
2007	1	1,000	5	480
2008	0	0	15	2,169
2009	1	1,000	13	2,694
2010	0	0	3	438
2011	4	2,500	5	793
2012	2	1,480	7	1,208
2013	2	1,372	7	1,014
2014	2	1,674	8	1,488
2015	0	0	6	1,159
2016	1	1,200	2	1,550
2017	2	1,150	2	1,150
2018	2	5,200	4	3,129
2019	1	1,200	10	2,900
2020	0	0	12	7,997
2021	0	0	13	22,918
2022	0	0	7	6,930
2023	1	388	8	38,785
2024	1	100	8	15,891
Total	21	20264	135	112693

Public Awareness and Tsunami Drill Programme in Malaysia

A Total of 132957 Participation for Public Awareness and Tsunami Drill Programme

[Data Source: Weather and Geophysics Division - Management and Mitigation Section - MET Malaysia]





PROGRAMME OBJECTIVE:

- Promote, disseminate, educate and prepared the public, government agencies and local authority with knowledge about hazard, risk, discipline, morale and spirit toward empowering the awareness and preparedness in the event of Extreme Weather, Earthquake and Tsunami.
- Promote the cooperation between National Disaster Management Agency (NADMA) and related response agencies with regard to the Malaysia National Tsunami Early Warning System Operation.

“Raising awareness today can save lives tomorrow. Let us unite to educate, prepare, and build resilient communities against earthquake and tsunamis”

TERIMA KASIH
THANK YOU

MALAYSIAN METEOROLOGICAL DEPARTMENT
MINISTRY OF NATURAL RESOURCES AND ENVIRONMENTAL SUSTAINABILITY