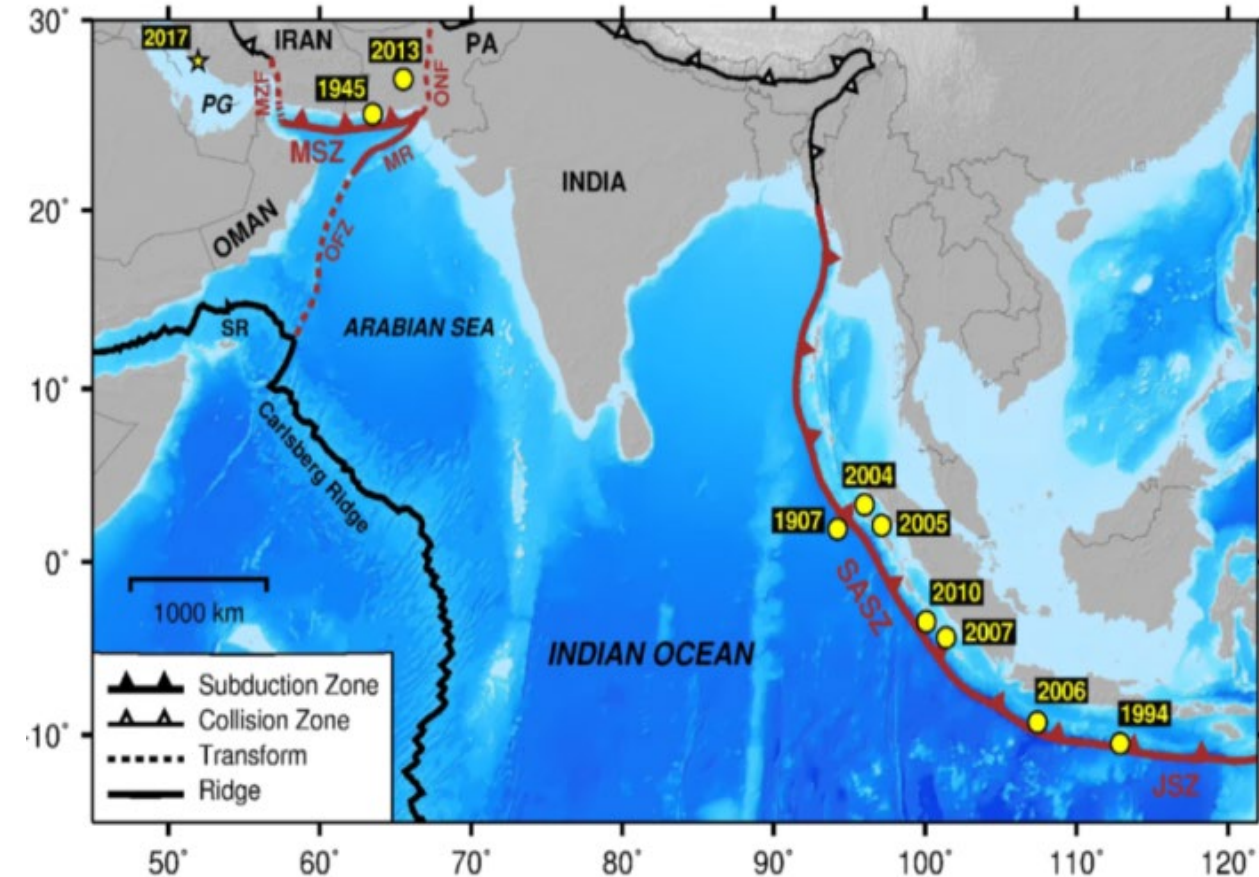




## **2.a. SOP-TEWS: NTWC Introduction to TSP Service and Products**

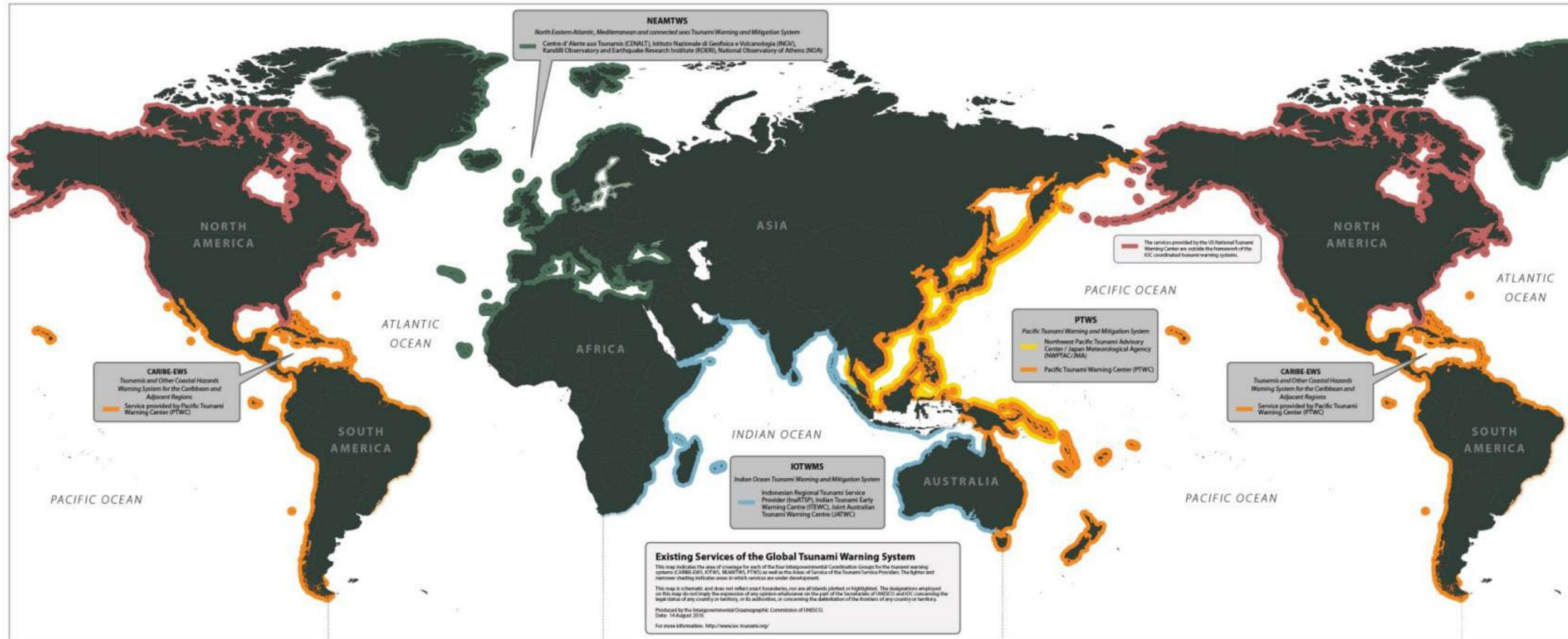
**Padmanabham, INCOIS, India  
Robert Greenwood, BoM, Australia  
Yedi Dermadi, BMKG, Indonesia**

# Tsunamigenic Sources in The Indian Ocean



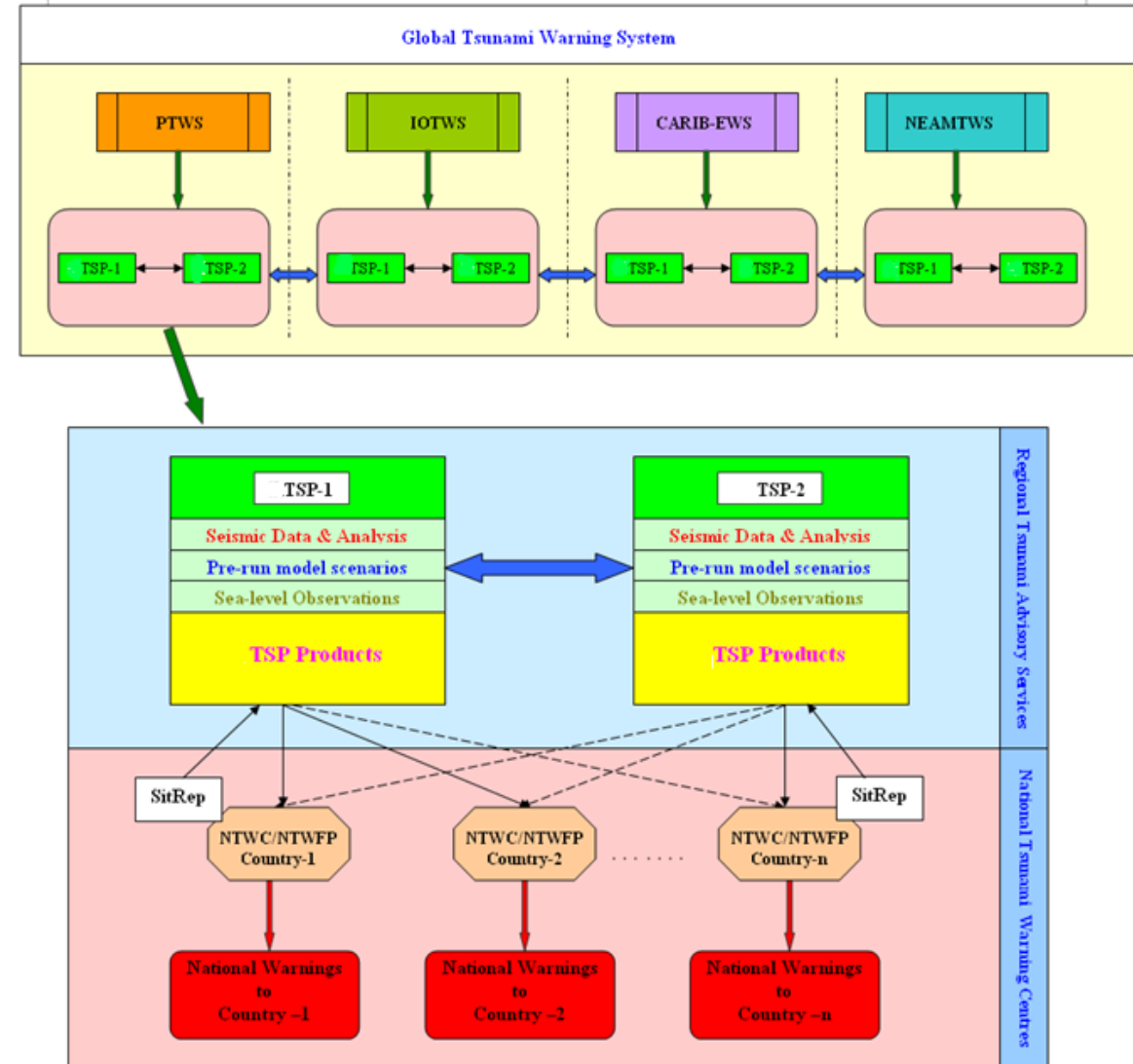
- Subduction Zone: Indian and Australian plates are moving north and eastward relative to Eurasian plate forming a convergent boundary
- Major Subduction Zones
  - Sumatra Andaman Subduction Zone ~6000 km
  - Makran Subduction Zone ~900 km
- Sumatra Andaman Subduction Zone (SASZ) – From Himalayan front southward through Myanmar, Andaman and Nicobar Islands, Sumatra, Java and the Sunda Islands (Sumba, Timor), to the north of Western Australia
- Makran Subduction Zone (MSZ) – lies between southeastern Iran and southwestern Pakistan

# Global Tsunami Warning System



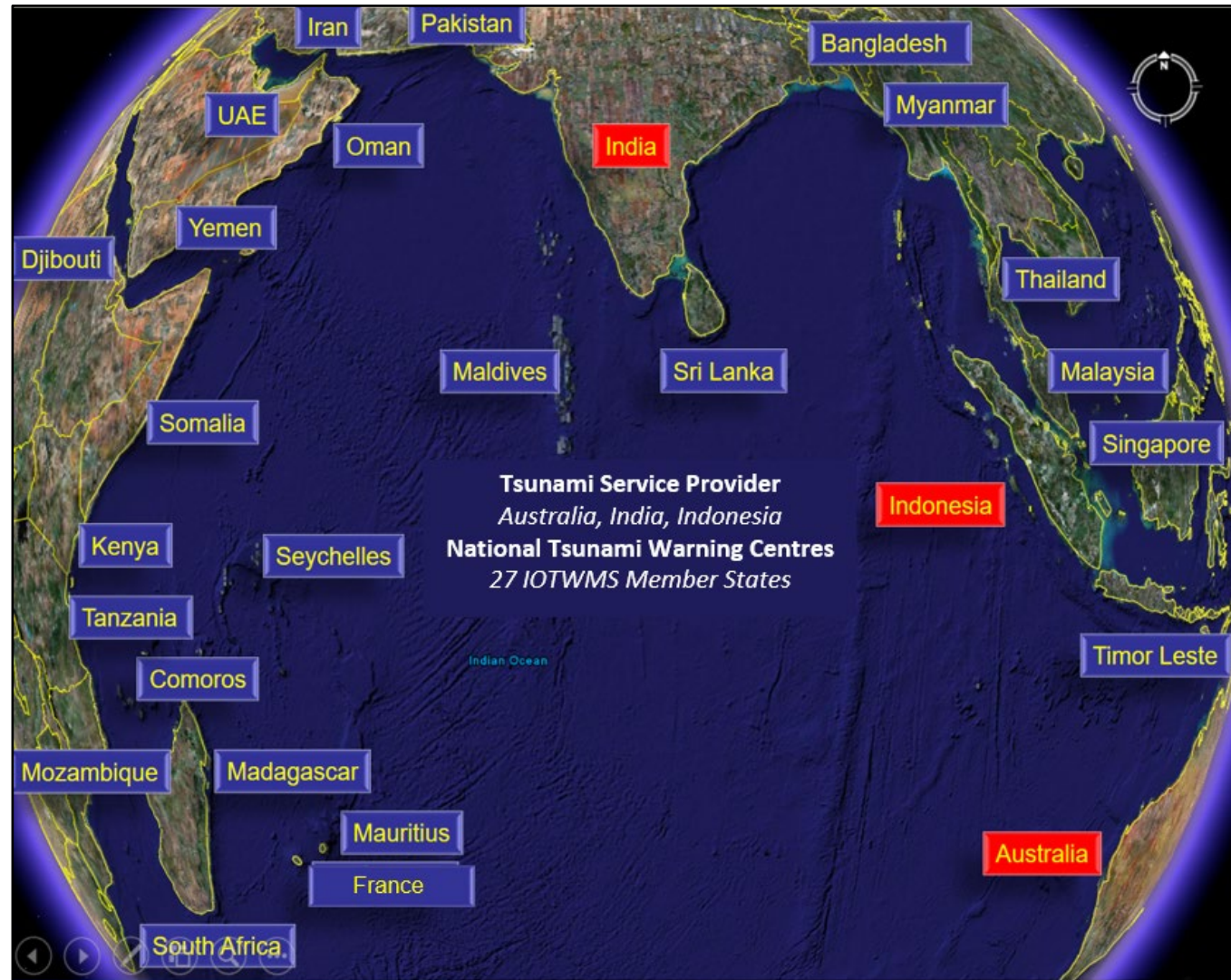
# Structure of Each Regional Tsunami Warning System

- Regional Tsunami Warning Systems operating in each Intergovernmental Coordination Group (viz. IOTWMS, PTWS, NEAMTWS, CARIBE-EWS) are the building blocks of a global TWS.
- Each TWS consists of one or more Tsunami Service Providers (TSPs) and multiple National Tsunami Warning Centres (NTWCs) e.g. IOTWMS has 3 TSPs and 27 NTWCs
- TSPs generate real-time products for NTWCs within their region.
- Having multiple TSPs provides redundancy for NTWCs ("system of systems" concept)
- NTWCs are solely responsible for providing warnings to their citizens based on their analysis of the situation
- IOTWMS TSP products are harmonized:
  - Consistent bulletin types, formats, information content and terminology
  - Consistent tsunami wave threat threshold and coastal zone definitions for whole Indian Ocean
  - Consistent content in TSP websites (but different "looks")





# Indian Ocean Tsunami Warning and Mitigation System



# Indian Ocean Tsunami Warning Service History

- **2005 to 31 March 2013:** Interim Advisory Service (IAS), provided by:
  - Pacific Tsunami Warning Centre (Hawaii)
  - Northwest Pacific Tsunami Advisory Centre (Tokyo)
- **12 October 2011 onwards:** Indian Ocean Tsunami Warning and Mitigation Service (IOTWMS), provided by:
  - 3 TSPs: Australia (JATWC), India (ITEWC), Indonesia (InaTEWS)
  - 27 NTWCs (including the 3 TSPs)
- The IAS and the IOTWMS operated in parallel from **12 October 2011 to 31 March 2013**, then the IAS ceased

# TSP Service Definition Document

Intergovernmental Oceanographic Commission  
Technical Series

146

## Definition of Services provided by Tsunami Service Providers of the IOTWMS

Version 4.0

UNESCO 2019

IOC Technical Series, 146  
Page (i)

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### ANNEXES

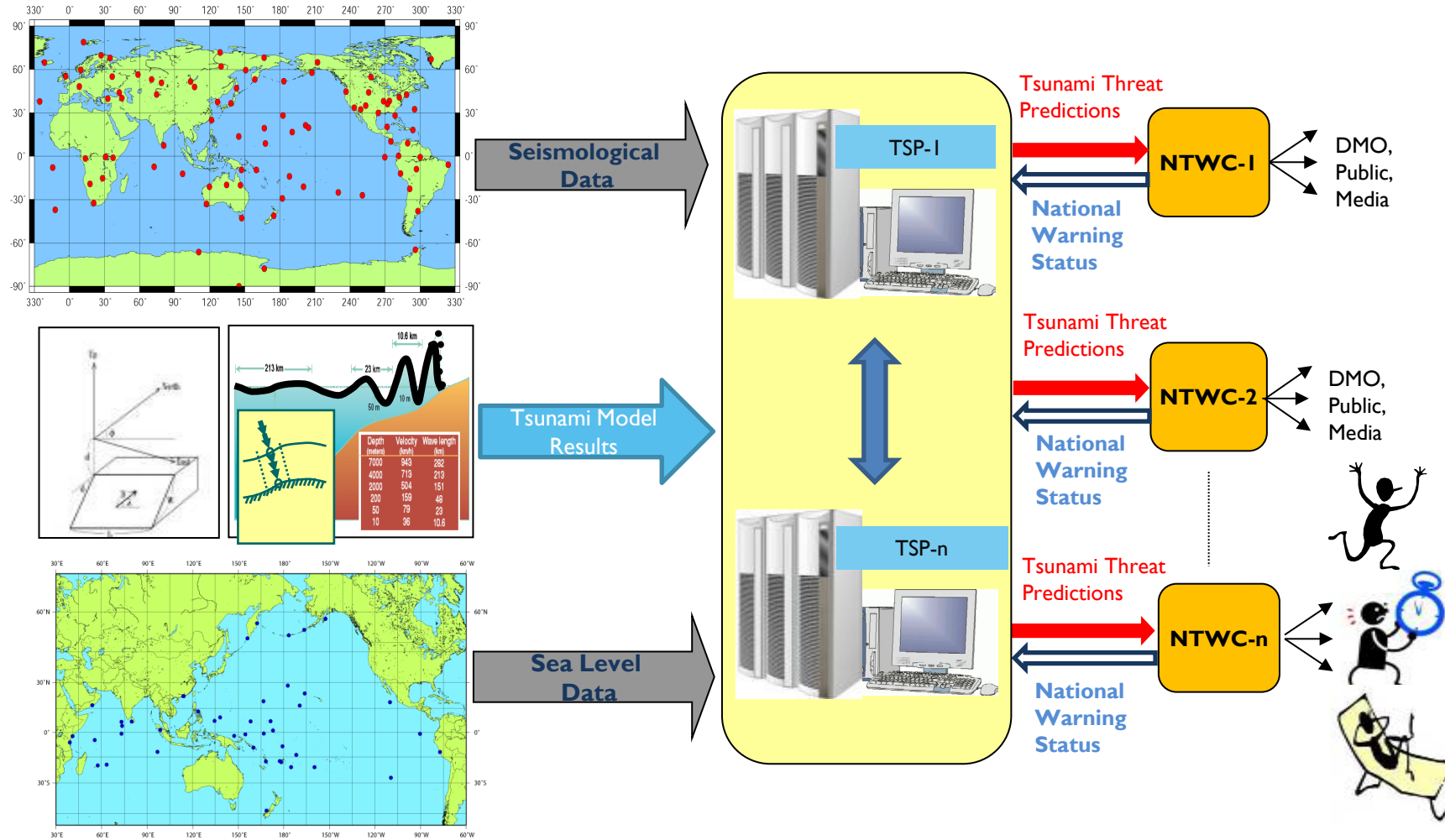
I	<a href="#">IOTWMS TSP AREA OF SERVICE (AOS) MAP AND GLOBAL AREA OF SERVICE MAP OF ICGS</a>
II	<a href="#">IOTWMS EARTHQUAKE SOURCE ZONE (ESZ) MAP</a>
III	<a href="#">TSP PERFORMANCE REPORTING TEMPLATE EXAMPLE</a>
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VII	<a href="#">NTWCS AND TSP ROLES AND RESPONSIBILITIES</a>
VIII	<a href="#">DOCUMENT CONTROL</a>
IX	<a href="#">LIST OF ACRONYMS</a>

# Roles and Responsibilities of TSPs

- Monitor earthquakes and provide timely initial magnitude and location information for those that could generate a tsunami (i.e. "potentially tsunamigenic")
- Generate specific coastal-zone threat information for all Indian Ocean countries using tsunami wave propagation models based on the earthquake information, and later confirmed or adjusted based on sea level observations
- Generate timely tsunami Exchange Bulletins and Threat Maps for use by NTWCs in their preparation and issuing of national tsunami warnings for their countries
- Monitor tsunami propagation and report updated tsunami wave amplitude observations
- Receive National Warning Status Reports from NTWCs and display on TSP Public Webpages
- Issue Public Bulletins containing details of the earthquake, national warning statuses as reported by the NTWCs, and tsunami wave observations
- Serve as a backup centre to other TSPs and as an NTWC for its own country



# Operational Elements of TSPs





# TSP Service Details

- TSP services contain **Tsunami Threat Information** for NTWCs – they are **not** Warnings
- **National Tsunami Warnings are the responsibility of the NTWCs** (unless bilateral arrangements are established between an NTWC and a TSP)
- TSPs generate **Service Level 1 Earthquake Bulletins** for all undersea earthquakes in the IOTWMS Earthquake Source Zone with magnitude  $\geq 6.5$
- TSPs then generate **Service Level 2 Threat Assessment Bulletins** if:
  - The earthquake is in the Indian Ocean
  - Or if the earthquake is outside the Indian Ocean but the magnitude is  $\geq 8.0$

# TSP Service Level 1 (since 2009)

-----  
TSUNAMI BULLETIN NUMBER 1  
REGIONAL TSUNAMI SERVICE PROVIDER – TSP INDONESIA (BMKG)  
issued at 0505 UTC Wednesday 09 February 2011  
-----

... EARTHQUAKE BULLETIN ...

This bulletin applies to areas within and bordering the Indian Ocean. It is issued in support of the UNESCO/IOC Indian Ocean Tsunami Warning and Mitigation System (IOTWMS).

## 1. EARTHQUAKE INFORMATION

TSP INDONESIA has detected an earthquake with the following preliminary information:

Magnitude: 9.0 Mwp  
Depth: 10km  
Date: 09 Feb 2011  
Origin Time: 0500 UTC  
Latitude: 7.20N  
Longitude: 92.90E  
Location: Nicobar, India

## 2. EVALUATION

Based on historical data and pre-run model scenarios, this earthquake is capable of generating a tsunami affecting the Indian Ocean region. TSP INDIA will monitor sea level gauges near the earthquake to determine if a tsunami was generated and will issue further bulletins as information becomes available.

Further information on this event will be available at:  
<http://inatews.bmkg.gov.id>

## 3. ADVICE

This bulletin is being issued as advice. Only national/state/local authorities and disaster management officers have the authority to make decisions regarding the official threat and warning status in their coastal areas and any action to be taken in response.

-----

1. Detection and reporting of earthquakes **potentially capable of generating tsunamis** (above magnitude 6.5km and undersea or near coast), within 10 minutes of the earthquake – generation of **IOTWMS Earthquake Bulletins**
2. Qualitative threat assessment (e.g. "...this earthquake is capable of generating a tsunami affecting the Indian Ocean region...")

# TSP Service Level 2 (since 2011)

## Threat Bulletins

TSUNAMI BULLETIN NUMBER 2 (TYPE-II THREAT ASSESSMENT BULLETIN)  
IOTWMS TSUNAMI SERVICE PROVIDER INDONESIA (InATWMS)  
Issued at 0515 UTC Wednesday 09 February 2011

... POTENTIAL TSUNAMI THREAT IN THE INDIAN OCEAN ...

This bulletin applies to areas within and bordering the Indian Ocean. It is issued in support of the UNESCO/IOC Indian Ocean Tsunami Warning and Mitigation System (IOTWMS).

1. EARTHQUAKE INFORMATION  
IOTWMS-TSP INDONESIA has detected an earthquake with the following details:

Magnitude: 9.0 Mwp (REVISED)  
Depth: 10km  
Date: 09 Feb 2011  
Origin Time: 0500 UTC  
Latitude: 7.20N  
Longitude: 92.50  
Location: Nicobar, India

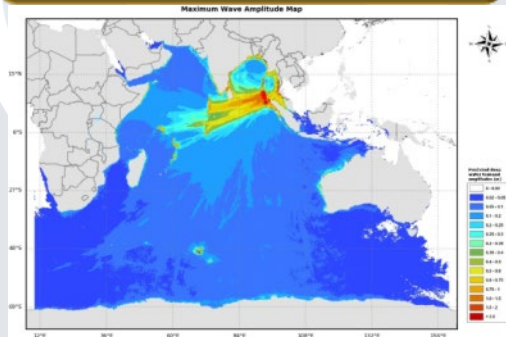
2. EVALUATION  
Earthquakes of this size are capable of generating tsunamis. However, so far there is no confirmation about the triggering of a tsunami.

An investigation is under way to determine if a tsunami has been triggered. This TSP will monitor sea level gauges and report if any tsunami wave activity has occurred.

Based on pre-run model scenarios, the zones listed below are POTENTIALLY UNDER THREAT.

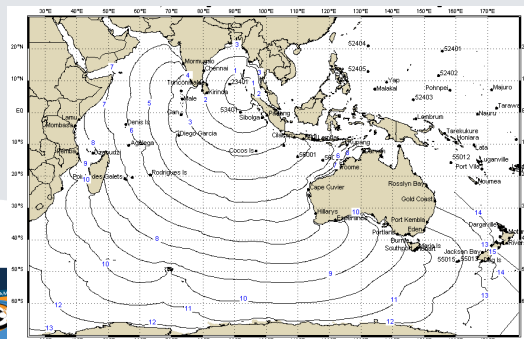
3. TSUNAMI THREAT FOR THE INDIAN OCEAN  
The list below shows the forecast arrival time of the first wave estimated to exceed 0.5m amplitude at the beach in each zone (or a different threshold nominated by an NTWC), and the amplitude of the maximum beach wave predicted for the zone. Zones where the estimated wave amplitudes are less than the threshold amplitude at the beach are not shown.

## Maximum Wave Amplitude Maps



## Coastal Zone Threat Tables

Zone	Model number	Sea Level Rise	Wave Amplitude	Threshold	Amplitude	Time	Wave
COASTAL ZONE 1	1	0.00	0.00	0.00	0.00	0.00	0.00
COASTAL ZONE 2	2	0.00	0.00	0.00	0.00	0.00	0.00
COASTAL ZONE 3	3	0.00	0.00	0.00	0.00	0.00	0.00
COASTAL ZONE 4	4	0.00	0.00	0.00	0.00	0.00	0.00
COASTAL ZONE 5	5	0.00	0.00	0.00	0.00	0.00	0.00
COASTAL ZONE 6	6	0.00	0.00	0.00	0.00	0.00	0.00
COASTAL ZONE 7	7	0.00	0.00	0.00	0.00	0.00	0.00
COASTAL ZONE 8	8	0.00	0.00	0.00	0.00	0.00	0.00
COASTAL ZONE 9	9	0.00	0.00	0.00	0.00	0.00	0.00
COASTAL ZONE 10	10	0.00	0.00	0.00	0.00	0.00	0.00



## Travel Time Maps



## Coastal Zone Threat Maps

## Threat Bulletins (text):

- Potential Threat
- Confirmed Threat
- Final Bulletin.

## Threat Details (maps and tables):

- Predicted Coastal Zones above threat threshold
- Predicted Maximum Wave Amplitudes
- Predicted Times of Arrival
- Tsunami wave observations received



# Bulletin Example: Potential Threat

TSUNAMI BULLETIN NUMBER 2 (TYPE-II THREAT ASSESSMENT BULLETIN)  
IOTWMS TSUNAMI SERVICE PROVIDER INDONESIA (InaTEWS)  
issued at 0515 UTC Wednesday 09 February 2011

... **POTENTIAL TSUNAMI THREAT** IN THE INDIAN OCEAN ...

This bulletin applies to areas within and bordering the Indian Ocean. It is issued in support of the UNESCO/IOC Indian Ocean Tsunami Warning and Mitigation System (IOTWMS).

## 1. EARTHQUAKE INFORMATION

IOTWMS-TSP INDONESIA has detected an earthquake with the following details:

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Depth: 10km  
Date: 09 Feb 2011  
Origin Time: 0500 UTC  
Latitude: 7.20N  
Longitude: 92.90  
Location: Nicobar, India

## 2. EVALUATION

Earthquakes of this size are capable of generating tsunamis. However, so far there is no confirmation about the triggering of a tsunami.

An investigation is under way to determine if a tsunami has been triggered. This TSP will monitor sea level gauges and report if any tsunami wave activity has occurred.

Based on pre-run model scenarios, **the zones listed below are POTENTIALLY UNDER THREAT.**

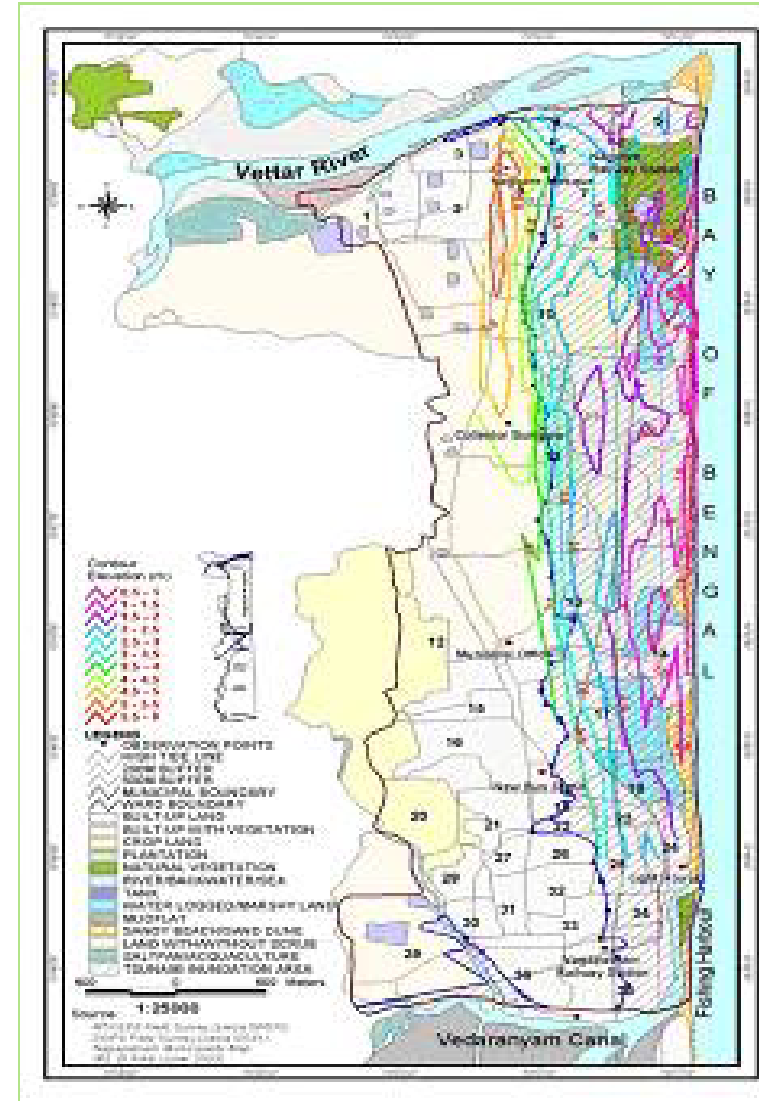
## 3. TSUNAMI THREAT FOR THE INDIAN OCEAN

The list below shows the forecast arrival time of the first wave estimated to exceed 0.5m amplitude at the beach in each zone (or a different threshold nominated by an NTWC), and the amplitude of the maximum beach wave predicted for the zone. Zones where the estimated wave amplitudes are less than the threshold amplitude at the beach are not shown.

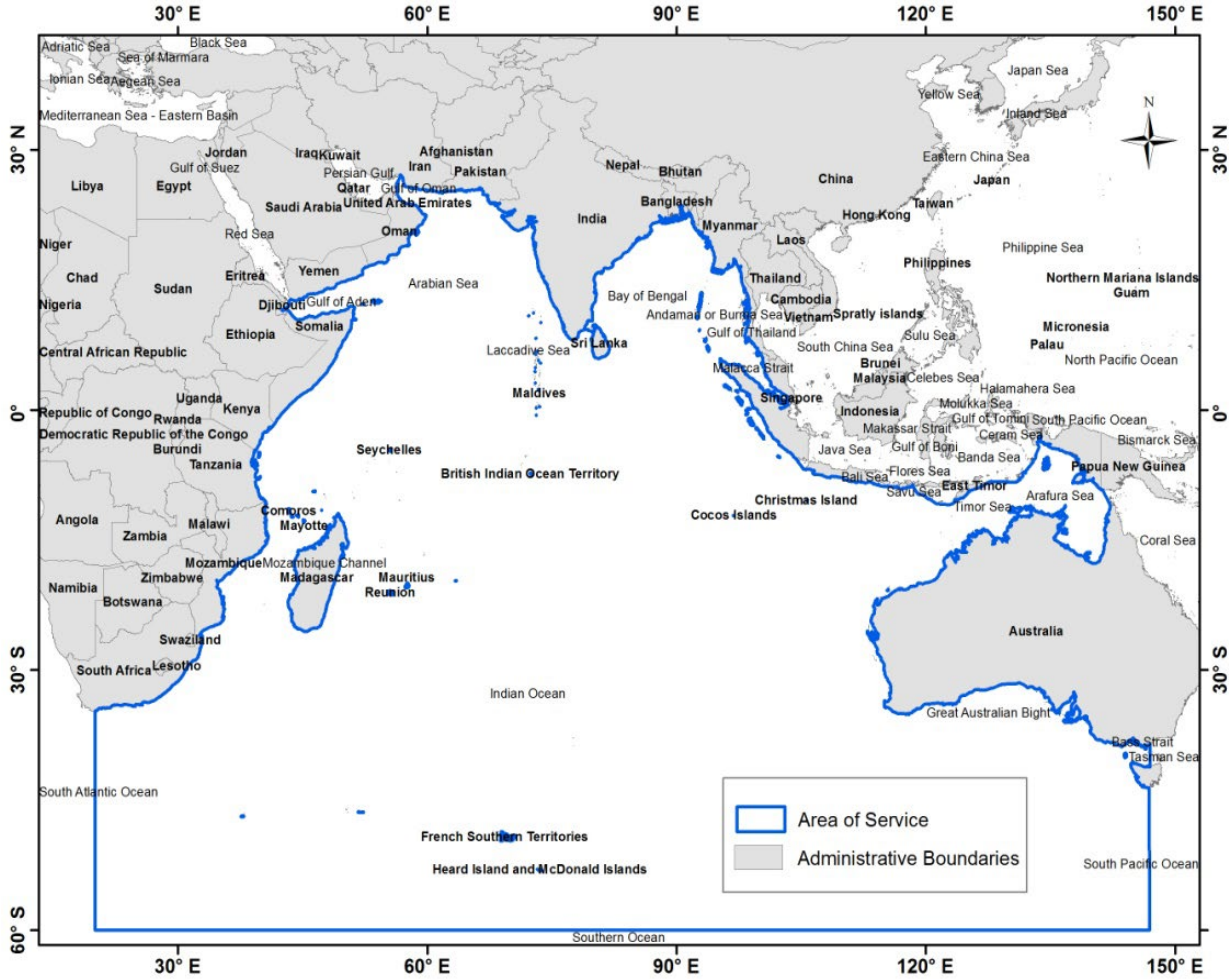
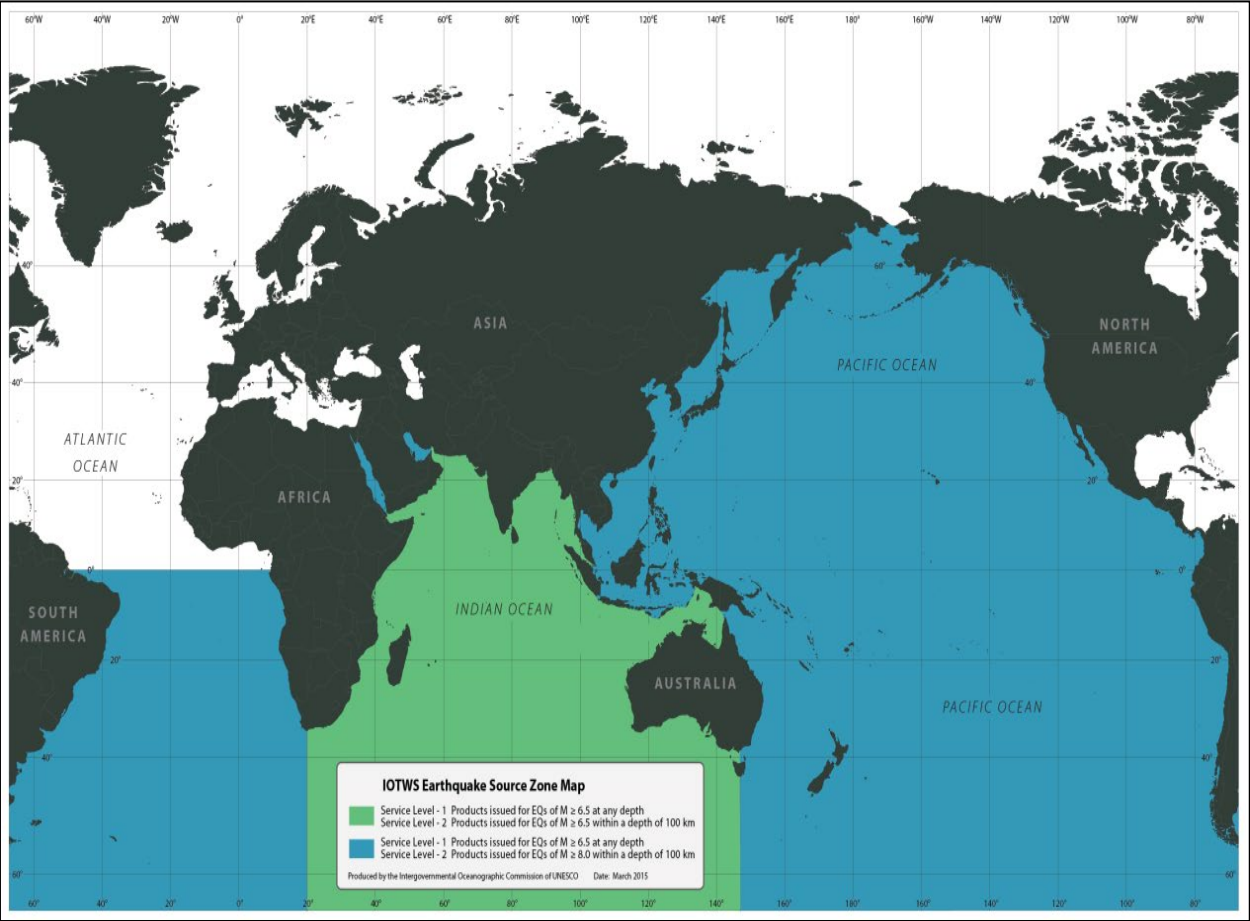
## TSP Service Level 3 (not in operation)

❖ NTWCs under bilateral agreements with TSPs will develop **enhanced national tsunami warnings** using:

- **Inundation mapping**
- **Risk and hazard assessments**

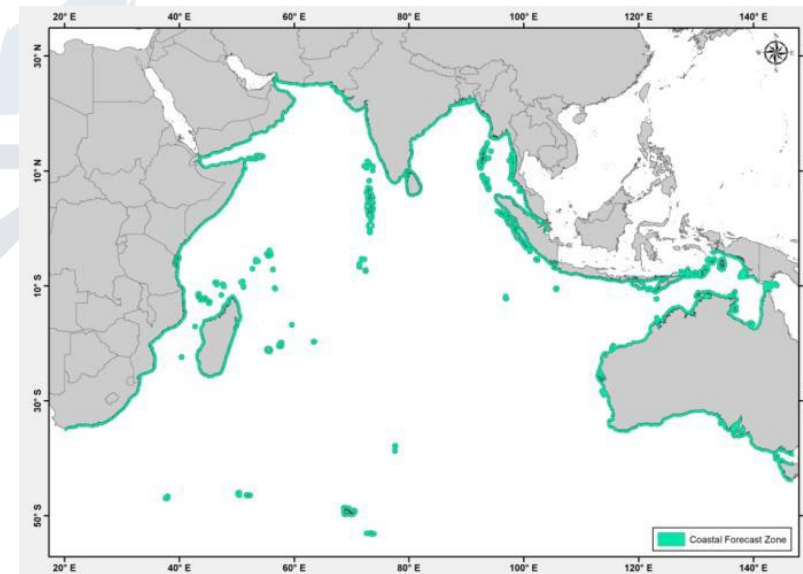
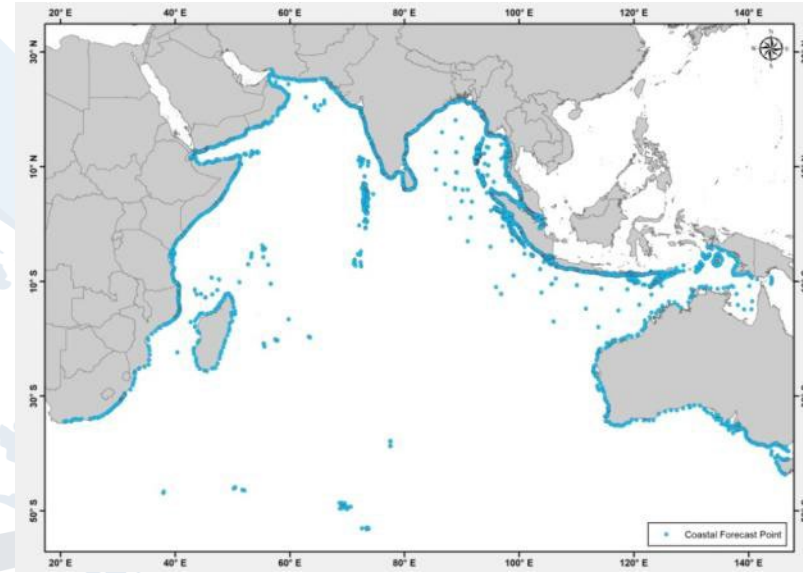


# IOTWMS Earthquake Source zone and Area of Service



# IOTWMS Coastal Forecast Zones

- Total Coastal Forecast Zones (CFZs) are 581.
- Total Coastal Forecast Points (CFPs) are 2251.
- Each coastal forecast zone is represented by a seamless buffer zone along the coast and 50 km in width across the coast.
- The zone starts from the coastal district administrative boundary instead of 30 m bathymetry as in earlier versions. Divisions made as per Global Administrative Boundaries (GADM-V3.6)
- Updated Version CFZ V 2018 Mar 14



# TSP Bulletins

- **TSP Tsunami Bulletins** for NTWCs are placed on password-protected websites, in the form of:
  - Earthquake Bulletins
  - Tsunami Threat Assessment Bulletins:
    - No Threat Bulletin
    - Potential Threat Bulletin
    - Confirmed Threat Bulletin with Tsunami Wave Observations
  - Final Bulletin (Threat Passed)
- TSPs transmit **Notification Messages** to NTWCs (by GTS, email, fax, SMS) notifying that the bulletins have been generated and are available on the TSP websites



# Tsunami Prediction Information

All predictions are provided for each **Coastal Forecast Zone**

## **Predicted Wave Heights:**

- **Maximum tsunami wave amplitude at the shore line** (max\_beach)
- **Maximum tsunami wave amplitude in deep water** (max\_deep) and **depth of the water**
- **Threat Category:** Threat or No Threat, based on 0.5 m threshold at shore line (1.0m wave crest-to-trough)

## **Predicted Wave Arrival Times:**

- **T1** – Arrival time of the first detectable tsunami wave (2cm positive or negative amplitude wave)
- **T2** – Arrival time of first wave exceeding 0.5m threat threshold
- **T3** – Arrival time of maximum amplitude wave
- **T4** – Arrival time of last wave exceeding 0.5m threat threshold

# Bulletin Types and Content

Bulletin type	Information	Time of issue
<b>TYPE 1 Earthquake Bulletin</b>	<b>Earthquake Information</b> , plus a <b>qualitative threat assessment</b> (e.g. “,,this earthquake may be capable of generating a tsunami...”)	Target: within 10 minutes
<b>TYPE 2 Threat Assessment Bulletin</b>	<b>No Threat Bulletin</b> , based on assessment using model scenarios	Target: within 20 minutes
	<b>Potential Threat Bulletin</b> , based on assessment using wave models. Contains <b>specific threat information</b> for each Indian Ocean coastal zone.	
<b>TYPE 3 Threat Confirmation Bulletin</b>	<b>Confirmed Threat Bulletin</b> , based on real-time <b>sea-level observations confirming a tsunami was generated</b> . Contains specific threat information for each coastal zone.	<ul style="list-style-type: none"> <li>• When the first real-time sea level observation confirming tsunami waves is available</li> <li>• Then hourly updates, or when significant new real-time sea level observations are available</li> </ul>
<b>TYPE 4 Final Bulletin</b>	<b>THREAT PASSED – all zones.</b>	120 mins after the last exceedance of 0.5 M threat threshold at last IO country

# TSP Websites for NTWCs

**TSP Password-Protected Websites** containing all the generated **tsunami bulletins**, **threat maps** and **threat tables**, plus the **NTWC Warning Status Reporting Form**.

**IOTWMS-TSP Australia**  
Tsunami Service Provider for the Indian Ocean Tsunami Warning and Mitigation Service (IOTWMS)  
A service provided by the Joint Australian Tsunami Warning Centre (JATWC), operated by the Australian Bureau of Meteorology and Geoscience Australia

**Recent Events**

- 06:12 UTC 07 September 2020 Mag 6.3 Vanuatu Islands
- 04:09 UTC 01 September 2020 Mag 6.7 Near Coast of Northern Chile
- 04:09 UTC 21 August 2020 Mag 6.9 Banda Sea
- 22:29 UTC 18 August 2020 Mag 6.8 Southwest of Sumatra, Indonesia
- 22:23 UTC 18 August 2020 Mag 6.8 Southwest of Sumatra, Indonesia
- 09:03 UTC 18 August 2020 Mag 6.8 Samar, Philippines
- 12:05 UTC 05 August 2020 Mag 6.5 Vanuatu Islands
- 09:54 UTC 26 July 2020 Mag 6.5 South Sandwich Islands Region
- 06:12 UTC 22 July 2020 Mag 8.0 Alaska Peninsula
- 02:50 UTC 17 July 2020 Mag 7.1 Eastern New Guinea Reg., PNG
- 22:54 UTC 06 July 2020 Mag 6.7 Java Sea
- 15:29 UTC 23 June 2020 Mag 7.2 Oaxaca, Mexico
- 12:49 UTC 18 June 2020 Mag 7.4 South of Komodo Islands
- 15:01 UTC 13 June 2020 Mag 6.7 Ryukyu Islands, Japan
- 06:00 UTC 10 June 2020 Mag 6.8 Nicobar Islands, Indian region \*\*\* TEST EVENT \*\*\*
- 4 Final Bulletin 0549 UTC 10 Jun 2020
- 3 Conditional Threat Bulletin 0530 UTC 10 Jun 2020
- 2 Potential Threat Bulletin 0519 UTC 10 Jun 2020
- 1 Unpublished Bulletin 0505 UTC 10 Jun 2020
- 08:49 UTC 04 June 2020 Mag 6.8 Halmahera, Indonesia

**EARTHQUAKE: Nicobar Islands, Indian region \*\*\* TEST EVENT \*\*\* 06:00 UTC 10 June 2020 Mag 9.0**

**INFORMATION FOR BULLETIN 3. Confirmed Threat Bulletin 0630 UTC 10 Jun 2020**

Exchange Bulletin Threat Map Threat Table Deep Water Wave Amplitude Map Travel Time Map IOTWC Status Reporting Form Other Data

**SELECT COUNTRY:**

- AUSTRALIA
- BAHAGADSH
- COMOROS
- DIJICUTI
- FRANCE
- INDIA
- INDONESIA
- IRAN
- KENYA
- MADAGASCAR
- MAURITIA
- MAURITIUS
- MOZAMBIQUE
- MYANMAR
- OMAN
- PAKISTAN
- SEYCHELLES
- SINGAPORE
- SOMALIA
- SOUTH AFRICA
- SRI LANKA
- TANZANIA
- THAILAND
- TIAMOR LESTE
- UNITED ARAB EMIRATES
- UNITED KINGDOM
- YEMEN

(Red = Threat, Blue = Threat Passed, Green = No Threat)

**ZONE PREDICTIONS FOR AUSTRALIA:**

COUNTRY ZONE	MAX BEACH (m)	MAX DEEP (m)	DEPTH AT MAX DEEP (m)	T1 (UTC) First Wave	T2 (UTC) First Above Threat Level	T3 (UTC) Max Wave	T4 (UTC) Last Above Threat Level	THREAT CATEGORY
ASHMORE REEF	0.21	0.05	287	10 Jun 1134Z		11 Jun 0906Z		No Threat
CHRISTMAS ISLAND	0.3	0.05	1336	10 Jun 0832Z		10 Jun 1332Z		No Threat
COCOS ISLAND	0.69	0.13	796	10 Jun 0812Z	10 Jun 0818Z	10 Jun 0829Z	10 Jun 0822Z	Threat
AURORA BANK	1.33	0.38	151	10 Jun 1606Z	10 Jun 1618Z	10 Jun 1722Z	10 Jun 2130Z	Threat
HEARD ISLAND AND MCDONALD ISLANDS	2.01	0.91	24	10 Jun 1554Z	10 Jun 1706Z	10 Jun 1814Z	11 Jun 0216Z	Threat
BEAGLE BONAPARTE COAST	0.15	0.07	24	10 Jun 1752Z		10 Jun 2312Z		No Threat
NORTH TIRI COAST	0.14	0.05	82	10 Jun 2044Z		11 Jun 0452Z		No Threat
PROPER GROOTE COAST								No Threat
ANAPURA COAST								No Threat


TSP-Australia

**Indian Tsunami Early Warning System**  
Ministry of Earth Sciences - Government of India

Home / About TSP / Archived Events / COMMO TEST

Home / System/Tsunami Events

System Activity for past 90 days with magnitude 7.0



Origin Time(UTC)	Region Name	Latitude(Deg)	Longitude(Deg)	Depth(m)	Magnitude	Regional Bulletin
06 Sep 2020 10:23:00	Mindanao, Philippines	6.00N	125.67E	10.0	6.7M	Public Exchange
01 Sep 2020 04:30:00	Near Coast of Northern Chile	27.98S	71.34W	10.0	6.5M	Public Exchange
01 Sep 2020 04:09:00	Near Coast of Northern Chile	27.92S	71.31W	10.0	6.5M	Public Exchange
21 Aug 2020 04:09:00	Banda Sea	6.78S	123.50E	654.0	6.6M	Public Exchange
18 Aug 2020 22:23:00	Southern Sumatra, Indonesia	4.41S	101.06E	10.0	6.5M	Public Exchange

TSP-India

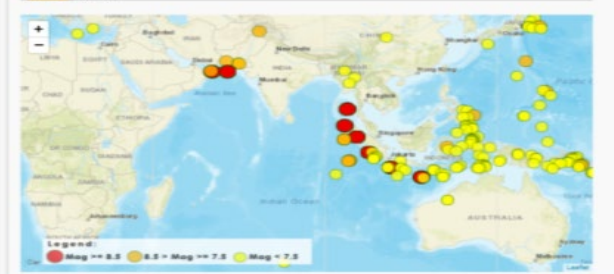
**AGENCY FOR METEOROLOGY CLIMATOLOGY AND GEOPHYSICS**  
Indonesia Tsunami Service Provider

**IndoTSP - Indonesia Tsunami Early Warning System**

Home / Public Bulletin / About the TSP / System Network / Contact Us

**Public Bulletin**

Event Map



**Public Bulletin**

IndoTSP Public Bulletin

**User Login**

Username:

Password:

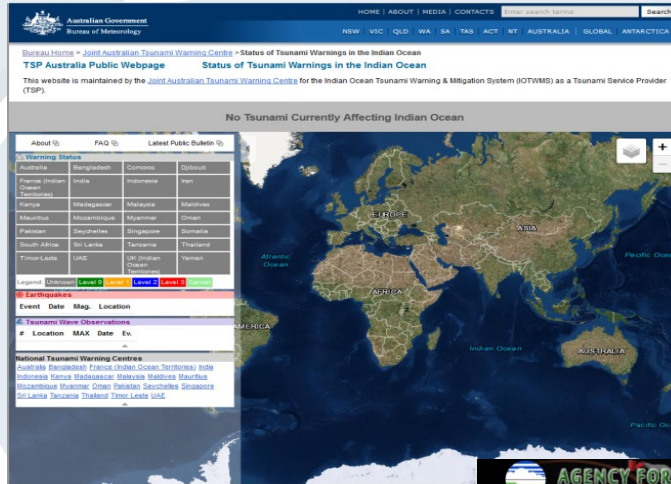
Forgot Password?

Copyright © 2020  
System Network: Indonesia Tsunami Early Warning System (IndoTSP)

TSP-Indonesia

# TSP Websites for Public

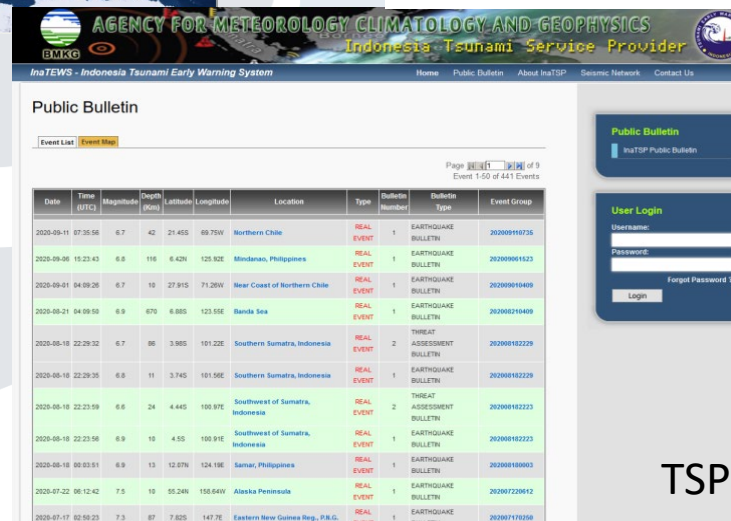
**TSP Public Websites and Public Bulletins** with information about the tsunami source, tsunami wave observations, and the **national warning status of each Indian Ocean country.**



TSP-Australia



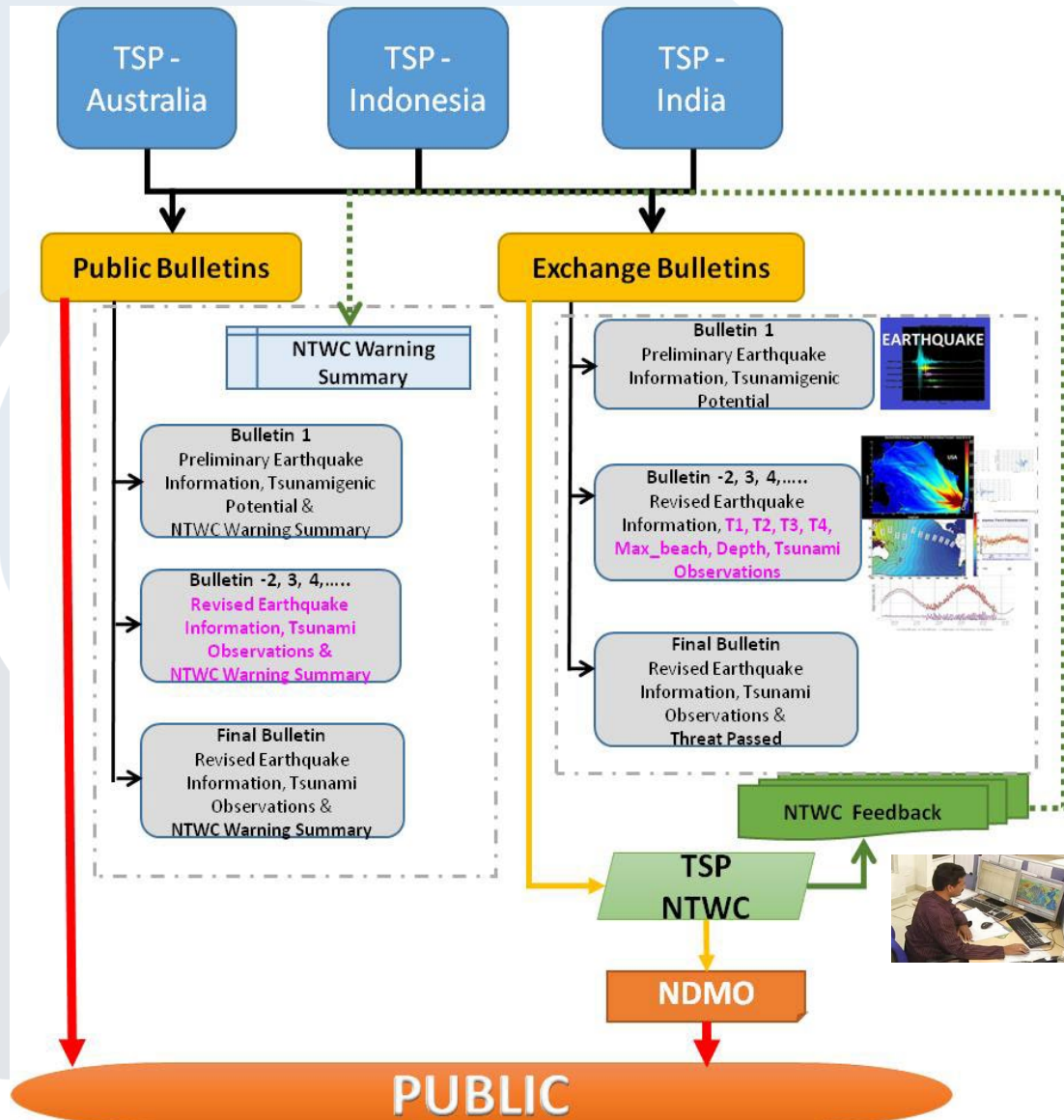
TSP-India



TSP-Indonesia



# NTWC Feedback – Status Reporting & Summary Pages



### Feedback – Status Reporting Page

Indian Tsunami Early Warning System

Ministry of Earth Sciences, Government of India

Home / About TSP / Feedback Status / Current Status

NTWC Feedback Status Reporting Form

This page is to be used by Indian Ocean National Tsunami Warning Centres (NTWCs) to advise TSPs of their current warning status. It should be used every time an NTWC issues a new or updated tsunami warning or cancellation for those countries. The information will be placed on TSP public websites to enable the public and other NTWCs to be aware of the warning status of each country.

**Basic Information**

Magnitude (preferred): 6.7  
Depth: 10  
Date: 08 Sep 2020  
Origin Time: 10:24 UTC  
Latitude: 6.00  
Longitude: 125.57  
Location: Mindanao, Philippines  
Lunar Ocean: PO  
Water Level Depth of Ocean: 100 (Located at a distance of 2 km from coastline on land)

**Current Warning Status**

1. Select your Country from the list on left.  
2. Select your Country's Current Warning Status (Threat Level 0, 1, 2 or 3) from the list below.  
3. Type Additional Information About the Warning Status in the text box below, such as the time and location for which the warning has been issued, and the type of warning issued, the "Sender Name" box.  
4. Click here to Submit Your Details.

1. Select Your Country:

- Australia
- Bangladesh
- Comoros
- France (Indian Ocean Territories)
- India
- Indonesia
- Kenya
- Madagascar
- Maldives
- Mauritius
- Mozambique
- Myanmar
- Oran
- Pakistan
- Seychelles
- Somalia
- South Africa
- Tanzania
- Thailand
- Timor-Leste
- UK (Indian Ocean Territories)
- Yemen

2. Select Your Country's Current Warning Status:

- Threat Level 0: No impact expected, no flooding, no currents.
- Threat Level 1: There is a potential for tsunami impact, but given the travel time, no response of the public is necessary in the immediate future.
- Threat Level 2: Threat of coastal inundation areas due to strong currents and surges in sea level.
- Threat Level 3: Threat of tsunami inundation to land areas.
- Cancellation/All Clear

3. Type Additional Information About the Warning Status:

4. Type Sender Name:

5. Type of Feedback Submission: This Sep 24 2020 12:00:00 GMT+05:30 India Standard Time

6. Type Sender E-mail:

7. Click here to Submit Your Details.

<https://tsunami.incois.gov.in/TEWS/NTWCReportingForm.jsp>

### Summary of the Current Threat Status as reported by the NTWCs

This page displays the summary of threat received from individual NTWCs regarding the Threat Status in their area of responsibility. Within 24 hrs of the current event ending (issue of FINAL Bulletin by TSPs), once further NTWC feedback is received, this page will be cleared to indicate no warnings.

**Legend**

- Threat Level 0: No impact expected, no flooding, no currents.
- Threat Level 1: There is a potential for tsunami impact, but given the travel time, no response of public is necessary in the immediate future.
- Threat Level 2: Threat of coastal inundation areas due to strong currents and surges in sea level.
- Threat Level 3: Threat of tsunami inundation to land areas.
- Cancellation/All Clear

Show 30 rows - entries

Country	Threat Status	Comments	Sender	Sender Time
Australia	-	-	-	-
Bangladesh	-	-	-	-
Comoros	-	-	-	-
France	-	-	-	-
India	-	-	-	-
Indonesia	-	-	-	-
Kenya	-	-	-	-
Madagascar	-	-	-	-
Maldives	-	-	-	-
Mauritius	-	-	-	-
Mozambique	-	-	-	-
Myanmar	-	-	-	-
Oran	-	-	-	-
Pakistan	-	-	-	-
Seychelles	-	-	-	-
Somalia	-	-	-	-
South Africa	-	-	-	-
Tanzania	-	-	-	-
Thailand	-	-	-	-
Timor-Leste	-	-	-	-
UK (Indian Ocean Territories)	-	-	-	-
Yemen	-	-	-	-

<https://tsunami.incois.gov.in/TEWS/NTWCStatusSummary.jsp>



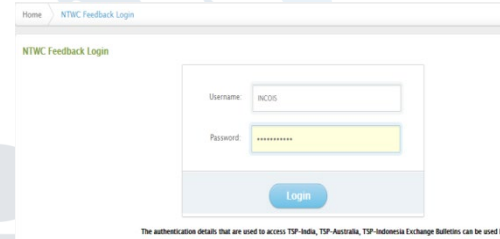
# NTWC Status Report Feedback form

## 1. Access through any of TSP websites (Exchange bulletins)

Password protected



## 1. Login to NTWC Feedback



Home > NTWC Feedback Login

NTWC Feedback Login

Username:

Password:

The authentication details that are used to access TSP-India, TSP-Australia, TSP-Indonesia Exchange Bulletins can be used here.

## 2. Report the Status & Submit



Indian Tsunami Early Warning System

INCIS

Home > About ITC > Feedback > NTWC Status Reporting Form

NTWC Status Reporting Form

This page is to be used to report the status of the NTWC system. It is a mandatory form to be filled out by the TSPs. The information provided here will be used to generate the NTWC status report. The information provided here will be used to generate the NTWC status report. The information provided here will be used to generate the NTWC status report.

1. Select Your Country:

2. Select Your Country's Current Warning Status:

3. Enter Additional Information About This Warning Status:

4. Check the box to Submit Your Details: ☐

<https://tsunami.incois.gov.in/TEWS/NTWCReportingForm.jsp>

## STATUS REPORTING

1. Select NTWC Country
2. Select Country Warning Status  
(Threat Level 0, 1, 2 or 3)

- > **Threat Level 0** - No impact expected, no flooding, no currents.
- > **Threat Level 1** - There is a potential for tsunami impact, but given the travel time, no response of the public is necessary at the moment.
- > **Threat Level 2** - Threat to coastal marine areas due to strong currents and oscillations in sea level.
- > **Threat Level 3** - Threat of tsunami inundation to land areas.
- > **Cancellation / All Clear**

3. Type Additional Information, if any  
(e.g. warning or impact details)

4. Input NTWC User Name

5. Input Sender Email

6. Press SUBMIT

## After Submission

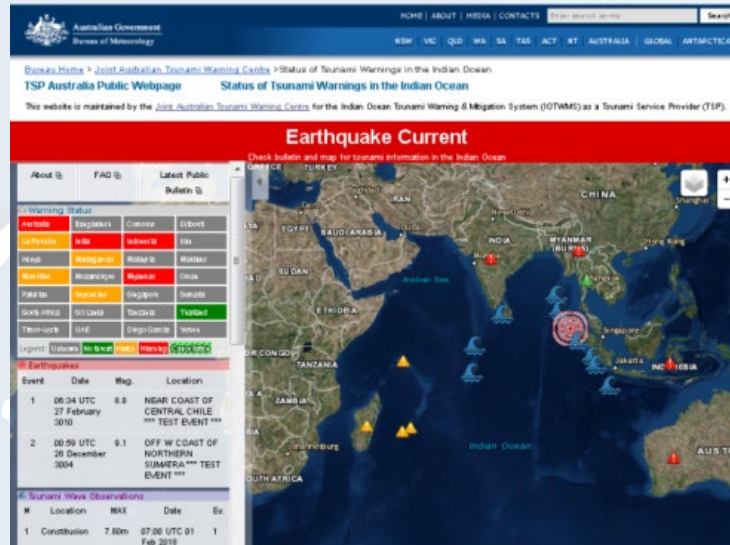
- Warning status is published to NTWC Warning Summary Page

(Within 24 hrs of the current event ending (issue of FINAL bulletin by RTSPs), if no further NTWC feedback is received, this page will be cleared to indicate no warnings).

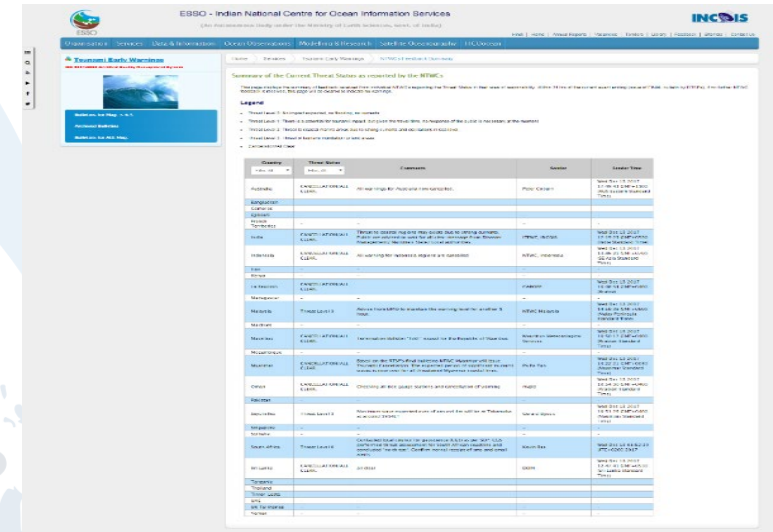
- Acknowledgement email sent to TSP Focal points

# TSP Public Webpages – Showing NTWC Status Feedback

## TSP Australia



## TSP India



## NTWC Status Report for this Bulletin

[Back to the lists](#)

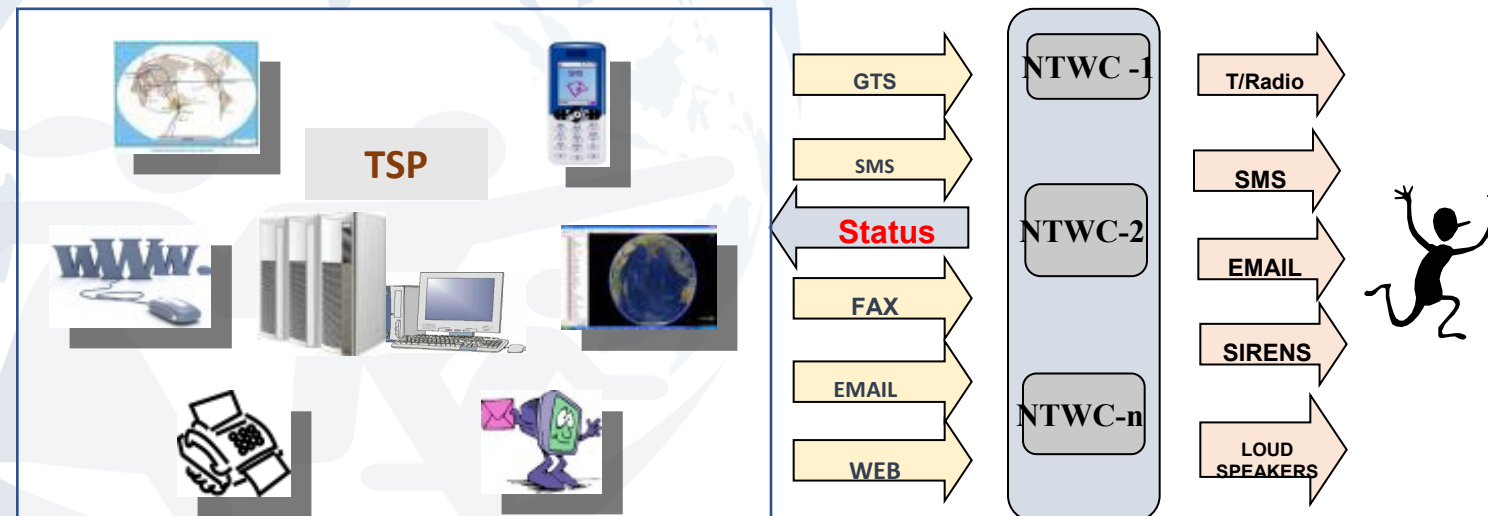
Magnitude **9.2**  
 Origin Time : 2016-09-07 03:00 UTC  
 Location : 1.935 - 99.22E (Southern Sumatra, Indonesia (IOWave-Sep-2016))  
 Depth : 10 Km  
 Bulletin : 12 5.18 (CONFIRMED TSUNAMI THREAT IN THE INDIAN OCEAN)

NTWC Country	Status	Comments	Sender	Time (UTC)
Seychelles	Threat Level 0: No impact expected, no flooding, no currents.	This is only an advisory	F. Albert	Wed Sep 07 2016 07:29:15 GMT+05:00 (Asian Standard Time)
Maldives	Threat Level 0: No impact expected, no flooding, no currents.	This is only an advisory	F. Albert	Wed Sep 07 2016 07:29:15 GMT+05:00 (Asian Standard Time)
Madagascar	Threat Level 0: No impact expected, no flooding, no currents.	NTWC MADAGASCAR bul 1	Bernardo	Wed Sep 07 2016 08:16:01 GMT+03:00 (EAT)
Pakistan	Threat Level 0: No impact expected, no flooding, no currents.		NTWC, Karachi Pakistan	Wed Sep 07 2016 11:36:48 GMT+05:00 (Pakistan Standard Time)
Sri Lanka	Threat Level 0: No impact expected, no flooding, no currents.		DOM	Wed Sep 07 2016 07:45:28 GMT+05:30 (Sri Lanka Standard Time)

## TSP Indonesia

# Product Formats & Dissemination

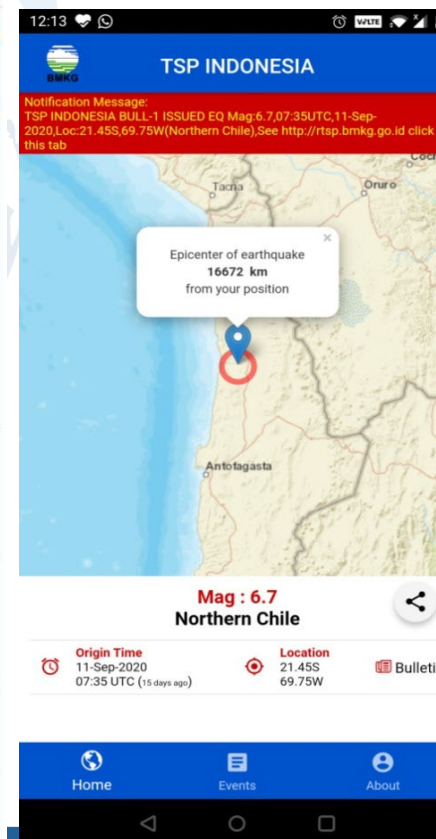
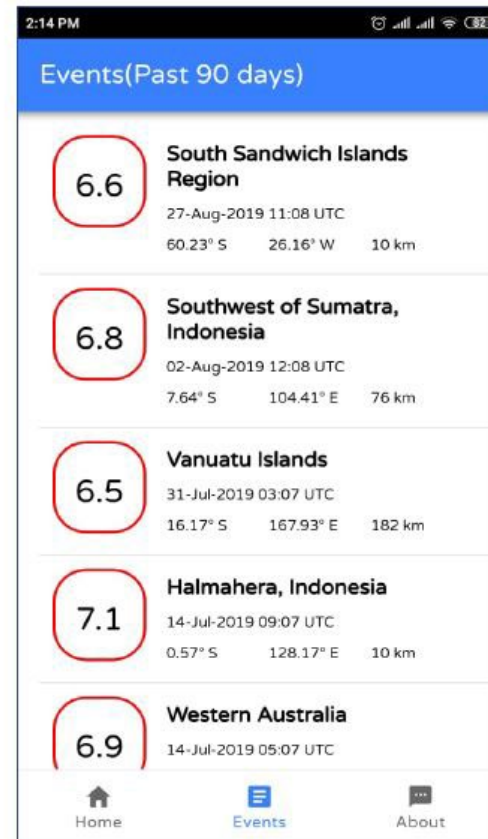
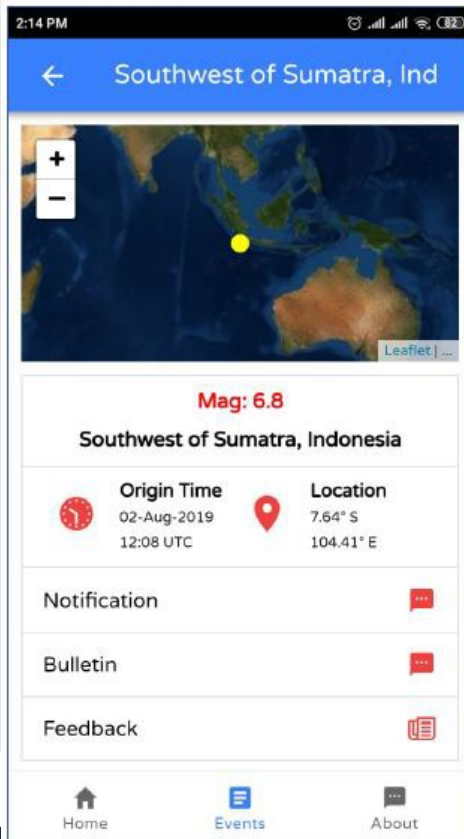
- Bulletin Notification Messages are issued in text format
- Bulletins are in text format on the websites
- Threat Tables in html format and Threat Maps in jpg or png format on the websites
- Spatial data is also available in dbf format on the websites



- NTWCs may also arrange for a TSP to send its bulletins directly to the NTWC by email

## TSPs adopted multi channel dissemination

- SMS,
- E-Mail
- FAX,
- GTS,
- Dedicated Websites,
- Mobile Apps and Social Media





# Bulletin Notification Message – Sent to NTWCs



-----  
TSUNAMI **BULLETIN NOTIFICATION** MESSAGE NUMBER 1  
REGIONAL TSUNAMI SERVICE PROVIDER - TSP AUSTRALIA [JATWC]  
ISSUED AT 1205 UTC SUNDAY 01 SEPTEMBER 2013  
-----

TO: INDIAN OCEAN NATIONAL TSUNAMI WARNING CENTRES [NTWCs]  
FROM: TSP AUSTRALIA

NOTIFICATION:  
TSP AUSTRALIA HAS **JUST ISSUED TSUNAMI BULLETIN NUMBER 1** FOR THE  
INDIAN OCEAN, BASED ON THE FOLLOWING EARTHQUAKE EVENT:

MAGNITUDE: 6.5 MWP  
DEPTH: 116KM  
DATE: 01 SEP 2013  
ORIGIN TIME: 1152 UTC  
LATITUDE: 7.60S  
LONGITUDE: 128.33E  
LOCATION: BANDA SEA, SUNDA ARC

**TO VIEW THE BULLETIN GO TO THE TSP AUSTRALIA WEBSITE AT:**

<http://reg.bom.gov.au/tsunami/rtsp/index.shtml>

NOTE: THIS IS A RESTRICTED-ACCESS WEBSITE CONTAINING TECHNICAL DATA  
FOR NATIONAL TSUNAMI WARNING CENTRES ONLY. IT IS NOT FOR GENERAL  
PUBLIC ACCESS.

GENERAL PUBLIC INFORMATION FOR THIS EVENT IS AVAILABLE FROM:

JOINT AUSTRALIAN TSUNAMI WARNING CENTRE [JATWC]  
BUREAU OF METEOROLOGY  
MELBOURNE, AUSTRALIA  
<http://www.bom.gov.au/tsunami>

END OF NOTIFICATION MESSAGE  
-----



United Nations  
Educational, Scientific and  
Cultural Organization



Intergovernmental  
Oceanographic  
Commission



Indian Ocean  
Tsunami Information  
Centre

**Pre-IOWave20 Webinar on Standard Operating Procedures (SOPs) for Tsunami Early Warning and Emergency Response**

Monday – Wednesday, 28-30 September 2020



# Earthquake Bulletin – On TSP websites only



TSUNAMI BULLETIN NUMBER 1 (**TYPE-I EARTHQUAKE BULLETIN**)  
IOTWMS TSUNAMI SERVICE PROVIDER INDONESIA (InaTEWS)  
ISSUED AT 0505 UTC WEDNESDAY 09 FEBRUARY 2011

-----

## ... EARTHQUAKE BULLETIN ...

This bulletin applies to areas within and bordering the Indian Ocean. It is issued in support of the UNESCO/IOC Indian Ocean Tsunami Warning and Mitigation System (IOTWMS).

### 1. EARTHQUAKE INFORMATION

IOTWMS-TSP INDONESIA has detected an earthquake with the following preliminary information:

**Magnitude:** 9.0 Mwp (REVISED)  
**Depth:** 10 km  
**Date:** 09 Feb 2011  
**Origin Time:** 0500 UTC  
**Latitude:** 7.20N  
**Longitude:** 92.90E  
**Location:** Nicobar, India

### 2. EVALUATION

Based on historical data and tsunami modelling, **this earthquake may be capable of generating a tsunami** affecting the Indian Ocean region.

IOTWMS-TSP INDONESIA will monitor sea level gauges near the earthquake to determine if a tsunami was generated and will issue further bulletins for this event.

Further information on this event will be available at:  
<http://inatews.bmkg.gov.id>

### 3. ADVICE

This bulletin is being issued as advice. Only national/state/local authorities and disaster management officers have the authority to make decisions regarding the official threat and warning status in their coastal areas and any action to be taken in response.

...continued

# Potential Threat Bulletin – On TSP websites only



-----  
TSUNAMI BULLETIN NUMBER 2 (TYPE-II THREAT ASSESSMENT BULLETIN)  
IOTWMS TSUNAMI SERVICE PROVIDER INDONESIA (InaTEWS)  
issued at 0515 UTC Wednesday 09 February 2011  
-----

## ... POTENTIAL TSUNAMI THREAT IN THE INDIAN OCEAN ...

This bulletin applies to areas within and bordering the Indian Ocean. It is issued in support of the UNESCO/IOC Indian Ocean Tsunami Warning and Mitigation System (IOTWMS).

### 1. EARTHQUAKE INFORMATION

IOTWMS-TSP INDONESIA has detected an earthquake with the following details:

Magnitude: 9.0 Mwp (REVISED)  
Depth: 10km  
Date: 09 Feb 2011  
Origin Time: 0500 UTC  
Latitude: 7.20N  
Longitude: 92.90  
Location: Nicobar, India

### 2. EVALUATION

Earthquakes of this size are capable of generating tsunamis. However, so far there is no confirmation about the triggering of a tsunami.

An investigation is under way to determine if a tsunami has been triggered. This TSP will monitor sea level gauges and report if any tsunami wave activity has occurred.

Based on pre-run model scenarios, the zones listed below are POTENTIALLY UNDER THREAT.

### 3. TSUNAMI THREAT FOR THE INDIAN OCEAN

The list below shows the forecast arrival time of the first wave estimated to exceed 0.5m amplitude at the beach in each zone (or a different threshold nominated by an NTWC), and the amplitude of the maximum beach wave predicted for the zone. Zones where the estimated wave amplitudes are less than the threshold amplitude at the beach are not shown.

# Potential Threat Bulletin (continued)



The list is grouped by country (alphabetic order) and ordered according to the earliest estimated times of arrival at the beach.

Please be aware that actual wave arrival times may differ from those below, and the initial wave may not be the largest. A tsunami is a series of waves and the time between successive waves can be five minutes to one hour.

The threat is deemed to have passed two hours after the forecast time for last exceedance of the 0.5m threat threshold for a zone. As local conditions can cause a wide variation in tsunami wave action, CANCELLATION of national warnings and ALL CLEAR determination must be made by national/state/local authorities.

## AUSTRALIA

COCOS ISLAND	0718Z 09 Feb 2011	1.3m
CHRISTMAS ISLAND	0755Z 09 Feb 2011	0.9m
KALBARRI TO NORTH CAPE	1005Z 09 Feb 2011	2.4m

## BANGLADESH

KUTUBDIA ISLAND	0752Z 09 Feb 2011	0.9m
BARISAL	0816Z 09 Feb 2011	1.3m

## 4. ADVICE

This bulletin is being issued as advice. Only national/state/local authorities and disaster management officers have the authority to make decisions regarding the official threat and warning status in their coastal areas and any action to be taken in response.

## 5. UPDATES

Additional bulletins will be issued by IOTWMS-TSP INDONESIA for this event as more information becomes available.

Other IOTWMS-TSPs may issue additional information at:

IOTWMS-TSP AUSTRALIA: <http://reg.bom.gov.au/tsunami/rtsp/>

IOTWMS-TSP INDIA: <http://www.incois.gov.in/Incois/tsunami/egevents.jsp>

## 6. CONTACT INFORMATION

IOTWMS-TSP INDONESIA:

METEOROLOGICAL CLIMATOLOGICAL AND GEOPHYSICAL AGENCY (BMKG)

Address: Jl. Angkasa I no.2 Kemayoran, Jakarta, Indonesia, 10720

Tel.: +62 (21) 4246321/6546316

Fax: +62 (21) 6546316/4246703

# Confirmed Threat Bulletin – On TSP websites only



-----  
TSUNAMI BULLETIN NUMBER 4 (**TYPE-III CONFIRMED THREAT BULLETIN**)  
IOTWMS TSUNAMI SERVICE PROVIDER INDONESIA (InaTEWS)  
issued at 0555 UTC Wednesday 09 February 2011  
-----

... **CONFIRMED TSUNAMI THREAT** IN THE INDIAN OCEAN ...

This bulletin applies to areas within and bordering the Indian Ocean. It is issued in support of the UNESCO/IOC Indian Ocean Tsunami Warning and Mitigation System (IOTWMS).

## 1. EARTHQUAKE INFORMATION

IOTWMS-TSP INDONESIA has detected an earthquake with the following details:

Magnitude: 9.0 Mwp  
Depth: 10km  
Date: 09 Feb 2011  
Origin Time: 0500 UTC  
Latitude: 7.20N  
Longitude: 92.90E  
Location: Nicobar, India

## 2. EVALUATION

Sea level observations have **confirmed that a TSUNAMI WAS GENERATED**.

**Maximum wave amplitudes observed so far:**

<b>Nicobar (India)</b>	<b>12.34N</b>	<b>91.65E</b>	<b>0520Z</b>	<b>09 Feb 2011</b>	<b>2.7m</b>
<b>Padang (Indonesia)</b>	<b>3.34S</b>	<b>93.42E</b>	<b>0550Z</b>	<b>09 Feb 2011</b>	<b>1.3m</b>

Based on pre-run model scenarios, the zones listed below are POTENTIALLY UNDER THREAT.

## 3. TSUNAMI THREAT FOR THE INDIAN OCEAN

The list below shows the forecast arrival time of the first wave estimated to exceed 0.5m amplitude at the beach in each zone (or a different threshold nominated by an NTCW), and the amplitude of the maximum beach wave predicted for the zone. Zones where the estimated wave amplitudes are less than the threshold amplitude at the beach are not shown.

...continues as for Potential Threat Bulletin...



# Final Bulletin – On TSP websites only



TSUNAMI BULLETIN NUMBER 9 (TYPE-IV FINAL BULLETIN)  
IOTWMS TSUNAMI SERVICE PROVIDER INDONESIA (InaTEWS)  
issued at 1220 UTC Wednesday 09 February 2011

... FINAL TSUNAMI BULLETIN FOR THE INDIAN OCEAN ...

This bulletin applies to areas within and bordering the Indian Ocean. It is issued in support of the UNESCO/IOC Indian Ocean Tsunami Warning and Mitigation System (IOTWMS).

1. EARTHQUAKE INFORMATION  
IOTWMS-TSP INDONESIA detected an earthquake with the following details:

Magnitude: 9.0 Mwp  
Depth: 10km  
Date: 09 Feb 2011  
Origin Time: 0500 UTC  
Latitude: 7.20N  
Longitude: 92.90E  
Location: Nicobar, India

2. EVALUATION  
Data from sea-level gauges confirmed that a tsunami was generated.

The expected period of significant tsunami waves is now over for all threatened Indian Ocean countries, based on IOTWMS-TSP INDONESIA modelling.

Because local conditions can cause a wide variation in tsunami wave action, CANCELLATION of national warnings and ALL CLEAR determination must be made by national/state/local authorities. Please be aware that dangerous currents can continue for several hours after the main tsunami waves have passed.

3. TSUNAMI WAVE OBSERVATIONS  
Listed below are maximum wave amplitudes recorded at the specified locations. Note that wave amplitude is measured relative to normal sea level: it is NOT the crest-to-trough wave height.

LOCATION	LAT	LO N	TIME	DATE	AMPL
Campbell Bay (Nicobar)	6.90N	93.74E	0504Z	09 Feb 2011	11.0m

# TSP Threat Table - On TSP websites

Firefox

Australia's offic... IOTWMS-TSP A... IOC Tsunami Pr... ESSO-INCOIS-L... : Indonesia ... x IOTWMS-TSP A... Google Maps Google Maps

**INDONESIA TSUNAMI SERVICE PROVIDER**

BMKG InaTSP

InaTEWS - Indonesia Tsunami Early Warning System Home Public Bulletin About InaTSP Contact Us Logout

## Event Detail

[Back to the lists](#)

Magnitude **9.0**

Origin Time : 2015-06-10 06:00:00 UTC  
 Location : 24.8N - 62.2E (Off Coast of Pakistan (CommTEST-Jun-2015))  
 Depth : 10 Km  
 Bulletin : 3 <sup>3.1</sup> (CONFIRMED TSUNAMI THREAT IN THE INDIAN OCEAN)  
 Type : TEST EVENT

Exchange Bulletin Notification Bulletin **Threat Table** Threat Map Travelltime Map 8 BHMax Map

Country	Location	T1 (UTC)	T2 (UTC)	T3 (UTC)	T4 (UTC)	EVW	Status
13. MALDIVES							
MALDIVES	KULHUGHUPUSHI	2015-06-10 09:17:00	2015-06-10 09:19:30	2015-06-10 09:23:30	2015-06-11 06:00:00	4.21	Threat
MALDIVES	GOLDHOO	2015-06-10 09:30:00	2015-06-10 09:32:15	2015-06-10 09:36:00	2015-06-11 05:59:00	3.08	Threat
MALDIVES	FERIDHOO	2015-06-10 09:33:45	2015-06-10 09:36:00	2015-06-10 09:43:00	2015-06-11 06:00:00	3.36	Threat
MALDIVES	KOLHUFUSHI	2015-06-10 09:43:00	2015-06-10 09:45:30	2015-06-10 09:53:45	2015-06-11 05:57:45	2.63	Threat
MALDIVES	MALE-NORTH	2015-06-10 09:46:45	2015-06-10 09:51:00	2015-06-10 22:23:45	2015-06-11 05:51:15	1.47	Threat
MALDIVES	DHIYAMIGILI	2015-06-10 09:50:15	2015-06-10 09:52:45	2015-06-10 10:06:15	2015-06-11 06:00:00	2.59	Threat
MALDIVES	MALE-SOUTH	2015-06-10 09:51:30	2015-06-10 09:54:45	2015-06-10 09:59:00	2015-06-11 06:00:00	2.44	Threat
MALDIVES	THINADHOO	2015-06-10 10:04:30	2015-06-10 10:07:00	2015-06-10 10:12:15	2015-06-11 05:56:45	3.05	Threat
MALDIVES	HITHADHOO	2015-06-10 10:15:45	2015-06-10 10:18:15	2015-06-10 10:21:15	2015-06-11 05:48:15	2.24	Threat

**Notes:**  
 The arrival time of the first detectable tsunami wave (2 m sea-surface amplitude)...

**Current Time (UTC)**  
 Nov 06, 2015  
**13:00:35**

**Miscellaneous**

- Earthquake Event List
- Earthquake Event Map
- NTWC Contacts
- Performance Indicator
- User and Password Information

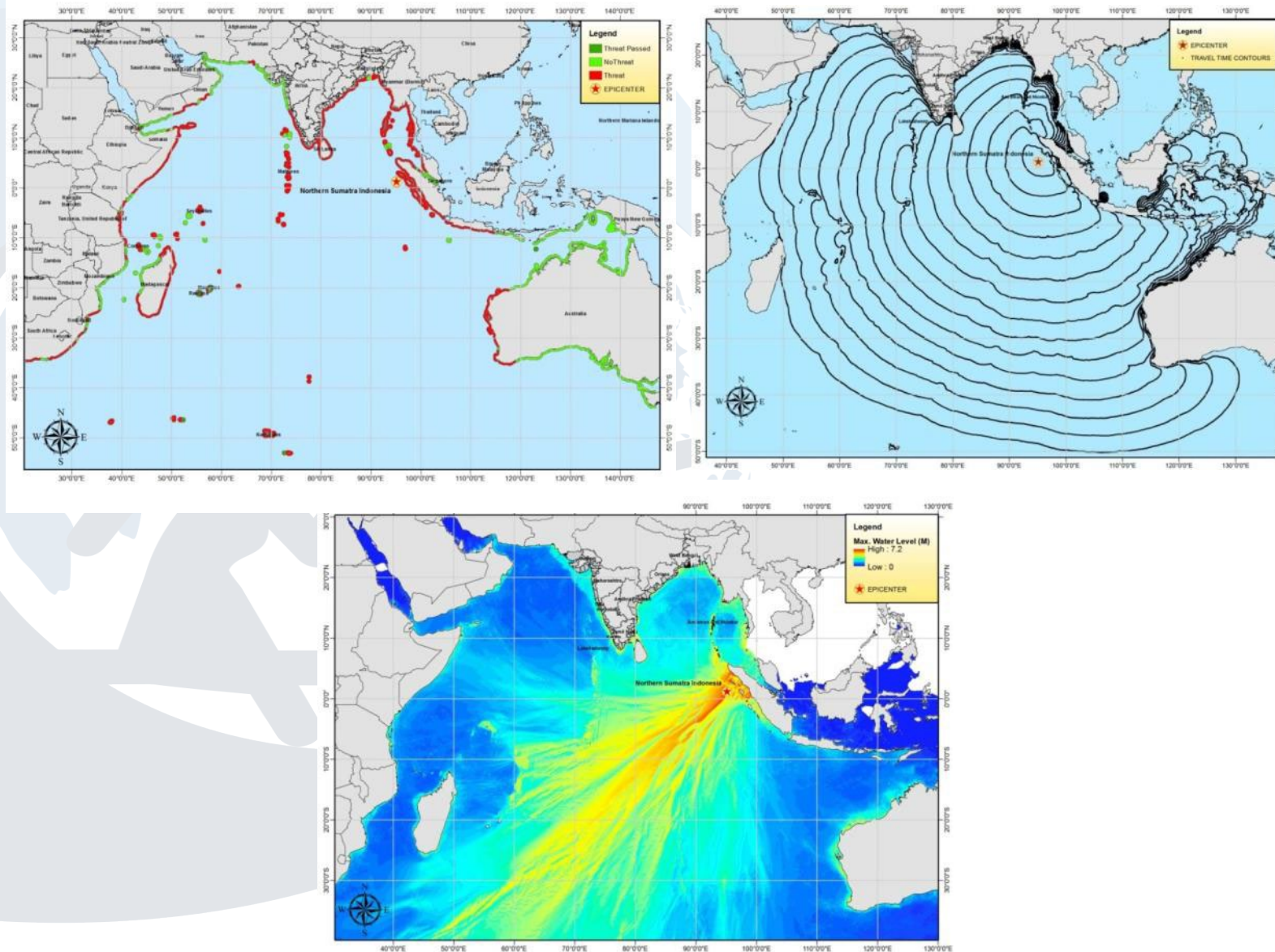
**Links**

- NTWC Status Reporting Form
- NTWC Feedback Summary
- TSP Australia Website
- TSP India Website
- IOC-UNESCO Website
- ICG/IOTWS Secretariat Website
- PTWC Website
- JMA Website

**Documentation**

- TSP Indonesia User Manual
- TSP Australia User Manual

# Threat Map, Travel Time Map, Energy Map – On TSP websites



# TSP Performance Indicators

Elapsed time from earthquake to generation of earthquake information bulletin	10 min
Elapsed time from earthquake to generation of threat assessment bulletin (No Threat or Potential Threat)	20 min
Percent of countries issued notifications of product generations	100%
Probability of detection of earthquakes with magnitude $\geq 6.5^*$	100%
Probability of detection of tsunamis above threshold (0.5m)	100%
Accuracy of earthquake location	30km
Accuracy of earthquake depth	30km
Accuracy of earthquake magnitude	0.3
Accuracy of the tsunami forecast amplitude/height	factor of 2
Reliability of TSP operations (power, computers, communications)	99.5%

\* Note that this KPI uses 6.8 as the magnitude for calculation purposes, to allow for the 0.3 magnitude accuracy value.





**unesco**

Intergovernmental  
Oceanographic  
Commission

# THANK YOU



IOWave25