

VERSION – 3

Indian Ocean Tsunami Warning System



**INDONESIA TSUNAMI EARLY WARNING SYSTEM
(InaTEWS)**

RTSP SERVICES USER GUIDE

for

National Tsunami Warning Centre



**AGENCY OF METEOROLOGY CLIMATOLOGY AND GEOPHYSICS (BMKG)
Earthquake Information and Tsunami Early Warning Centre**

Jl. Angkasa I No. 2 Kemayoran, Jakarta, Indonesia 10720

September 2014

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I. Introduction

During the ICG meeting in Mombasa, Kenya 28 February – 2 March 2007, the National Tsunami Warning Centre (NTWC) of Indonesia proposed to provide alert services to the member states of IOTWS as one of Regional Tsunami Service Provider (RTSPs) along with India, Australia, Malaysia, Thailand and Iran. We have been working together under the coordination of IOC/ICG-UNESCO in the group of IOTWS starting with the arrangement of requirements, interoperability schedule of work and finally looking at the implementation. While we worked at the implementation, PTWC and JMA voluntarily provided the service to all NTWCs in Indian Ocean Region as an Interim Advisory Service (IAS). In that period of time, RTSPs shadow the operation of IAS and provided service level 1 (earthquake information) until RTSPs are ready to provide full services of level 1 and 2.

The progress of implementation has been reported by RTSPs in every meeting, mainly in ICG meetings. The agreement has been met at ICG meeting that in the year 2011, RTSPs of Australia, India and Indonesia are ready to provide service level 2. However, all RTSPs are requested to provide a guideline of RTSP products for NTWC as a reference to NTWC decision making in case of a tsunami threat.

RTSP of Indonesia is operated by BMKG (the Agency for Meteorology Climatology and Geophysics) the leading institution and in charge of operating InaTEWS (Indonesia Tsunami Early Warning System) in cooperation with BIG and BPPT. The monitoring systems consist of seismic, tide gauge, GPS and Buoy networks, operated by BMKG, BIG (Geospatial Information Agency, previously: BAKOSURTANAL, National Coordinating Agency for Survey and Mapping) and BPPT (Agency for Assessment and Application of Technology), respectively. All data are transmitted in real-time or near real-time to BMKG which is operating of InaTEWS for the purpose of forecasting tsunami hazard analysis and warning dissemination.

This guideline provides information on the operation of InaTEWS as RTSP, the function of each monitoring system and detailed information on the contents of tsunami messages.

II. InaTEWS Components

The main components of InaTEWS are :

- 2.1. Monitoring and Processing system
 - 2.1.1. Seismic
 - 2.1.2. Global Positioning System (GPS)
 - 2.1.3. Tide Gauge
 - 2.1.4. Tsunami Modelling and Simulation
 - 2.1.5. Decision Support System.
- 2.2. Dissemination System

2.1. Monitoring and Processing system

2.1.1. Seismic Monitoring and Processing system

To observe seismic activities in Indonesia region, the InaTEWS is operating around 158 broadband seismographs (BBS out of 160 BBS planned) and also deploys about 180 accelerographs out of 500 accelerographs planned which are distributed around Indonesian archipelago. The development of BBS and SMA (Strong Motion Accelerograph) networks involved three donor countries and one international organization, namely: Germany, Japan, China and CTBTO. The accelerometer network is co-located with the broadband seismograph network stations.

Seismic data from seismic stations around Indonesia is transmitted real-time to the national earthquake centre and to ten regional earthquake centres. Data streams are sent via satellite communication such as VSAT. Then, the data is processed to obtain earthquake parameters.

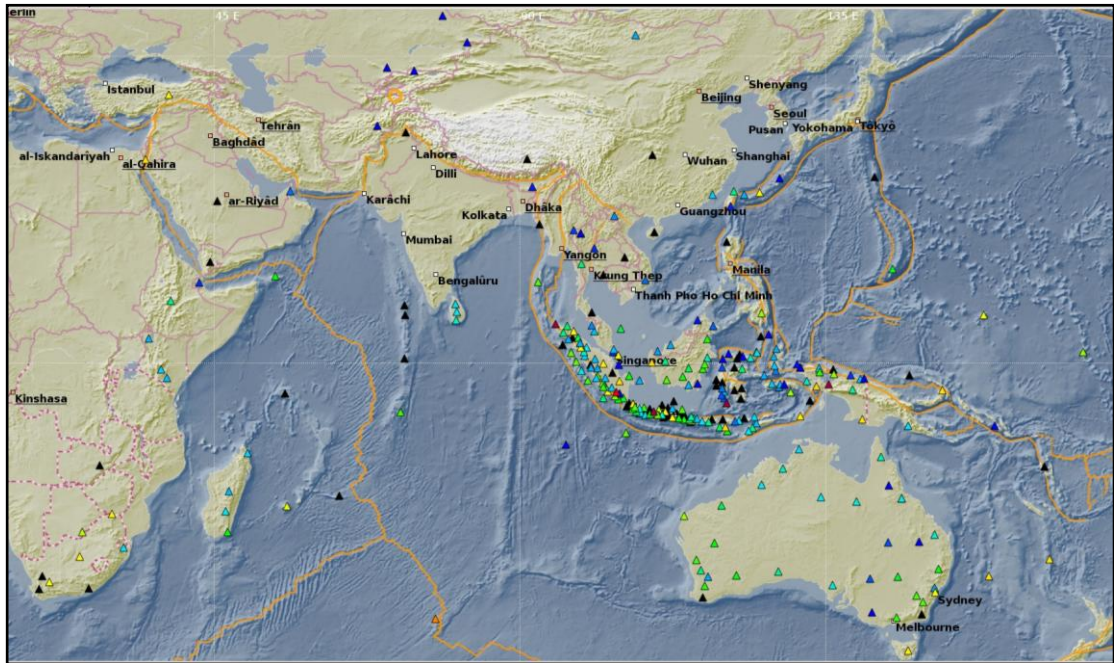


Figure 1 – Map of the Indonesian Seismic Network

SeisComP3 has been designed as a high standard automatic earthquake data acquisition system and near-real-time data processing tool for earthquake detection, location and visualization, as well as dissemination of event alerts. Hypocenter parameters and magnitude are available within 5 minutes after origin time and are the first reliable information for tsunami potential. Time available to issue a warning to coastal communities after a large earthquake in the Sunda Trench Region has generated a tsunami is extremely short, about 20 – 40 minutes. During the development additional functionalities were implemented to fulfill the requirements of 24/7 early warning control centers. Today, SeisComP3 provides the following main features :

- Fully automated data processing and event detection
- User interactions for review and correction via real time GUIs
- System monitoring and control via RTGUIs
- Prevention of operating errors by simplistic GUI design and semiautomatic workflow
- Modular design by process communication via messaging (SPREAD >TCP/IP)
- Unified software design and implementation (C++ / Qt)

Furthermore, requirements for early warning purposes have made it necessary to adopt guidelines for the design including, the implementation of critical functions as stand-alone module to guarantee independence from other functions (e.g. event picker, magnitude calculation, interactive analysis).

SeisComP3 offers easy implementation of custom modules, independence of hardware and software, the ability to exchange data between different real-time systems and distribution of modules on several systems. SeisComP3 is a rapid, robust and reliable earthquake data processing and analysis system.

The preferred magnitude ID is assigned by priority. The priority from high to low is listed as follows:

- Mw(mB)
- ML
- MLv
- mb

For each magnitude, a minimum of 3 station-magnitudes are required to permit pre-selection. For the Mw(mB) magnitude a minimum, of 4 station-magnitudes is required.

This order is pretty straightforward. Things become more difficult things below magnitude 6. Below magnitude 6, Mw(mB) does not have the highest priority, but mb, given certain preconditions. These are:

- Number of station-magnitudes of Mw(mB) < 30 or Mw(mB) < 6
- Number of station-magnitudes of Mw(mB) <= half the number of station-magnitudes of mb
- The average between Mw(mB) and mb is smaller than 6 :
 $(Mw(mB) / 2 < 6$

Are all these constraints fulfilled, then Mw(mB) is assigned the priority 0. The 'preferred magnitude' will be the magnitude with the highest priority, as explained above.

2.1.2. Global Positioning System (GPS) Monitoring and Processing System

National GPS network is also operated by BIG for mapping purposes. The national commitment of Indonesia supports the operation of GPS for tsunami purposes. Therefore, since 2005, BIG has upgraded the system to fulfil the requirement for TEWS operation.

The observation of crustal deformation also plays an important role in order to identify earthquakes mechanisms triggering tsunami occurrences. Some GPS stations are online with the warning centre of InaTEWS for monitoring deformation and an indication of tsunami generation.

GPS technologies offer a high potential to support tsunami early warning systems, especially for near-field cases. GPS stations detect ground motions associated with large earthquakes providing direct information on co-seismic deformation caused by the earthquake and its relevance to the tsunami potential of the earthquake. For the first time, InaTEWS integrates GPS-based methods as part of an operational tsunami early warning system. GPS sensor networks are located at land-based stations further away from the coast, sometimes co-located with seismic stations and in coastal areas co-located with tide gauges. Near real-time processing allows monitoring and display of results and delivers first co-seismic deformation vectors only 4-6 minutes after the earthquake.

The GPS processing system provides the following features:

- Real-time data acquisition and processing
- Data quality control
- Data recording
- Real-time data exchange
- Network status monitoring
- Automatic calculation of deformation vectors for each station

This information is used in the decision process for proper selection of pre-calculated tsunami simulations. GPS station data is available at the

national warning center, processed and visualized at the Ground Tracking System terminal and available for DSS.

2.1.3. Tide Gauge Monitoring and Processing System

The Geospatial Information Agency (BIG) upgraded the system to fulfil the requirement for InaTEWS operation. Currently, within the operation of InaTEWS, the data of 90 tide gauge stations are to the warning centre of InaTEWS. Some of the tide gauge stations are available through public domain provided by IOC-UNESCO website <http://www.ioc-sealevelmonitoring.org/map.php>. Currently, about 30 tide gauges are transmitting data in real-time to BMKG and BIG.

Sea level data from tide gauges or so-called DART systems play an indispensable role in the warning process for verification of the tsunami threat and improving the situation assessment.

The sea level data processing and display system at the warning centre allows for :

- Real-time data acquisition and processing
- Data quality control
- Data recording
- Data display
- Network status monitoring
- Automatic calculation of arrival times and wave heights

The processing system automatically provides de-tiding of the incoming data stream for each station (if the characteristics of the station like location and surroundings are known) and detection of significant sea level changes which might be due to a tsunami. Processed data are submitted to the Decision Support System to serve as one criteria for simulation selection from the Tsunami data base.

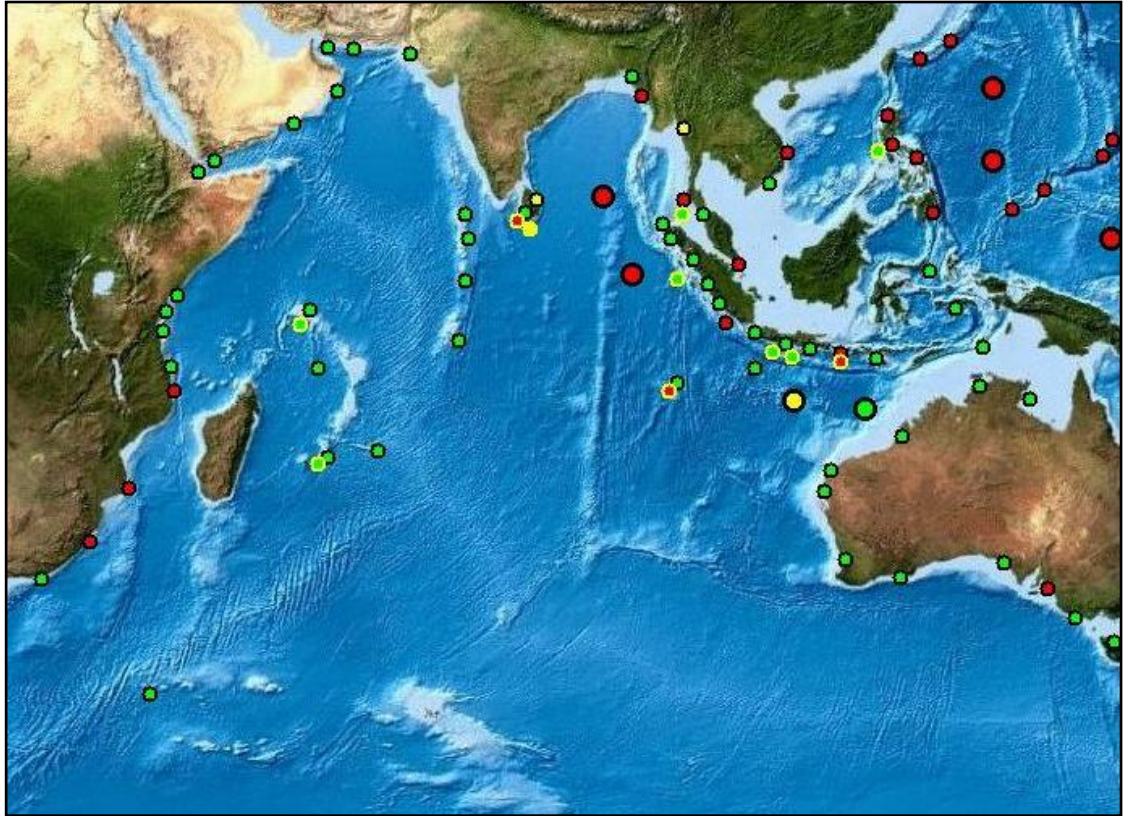


Figure 2 - Map of the Regional Tide Gauge Network

2.1.4. Tsunami Modelling and Simulation System

The tsunami simulation system is the component of the warning system to create early situation scenarios, as no continuous global observation exists to monitor the ocean surface. Basis of the tsunami simulation system is the modelling software TsunAWI which includes advanced tsunami source and realistic near-field tsunami modelling as well as GPS-based real-time source inversion modelling. A 3-D model of the interface between the subducted oceanic and continental plates utilizes geophysical and geological data and is subdivided into 2250 rectangular patches with dimensions of about 40 x 15km. Green's function approach in layered media is employed to pre-calculate 3D surface deformation according to unit slope at each patch. These unit sources are then combined to predict tsunamigenic sea floor uplift for arbitrary complicated rupture. TsunAWI then uses an unstructured and adaptive mesh based on bathymetry for finite element tsunami simulation. This

software incorporates wave propagation and detailed inundation modelling in a seamless and accurate way. The unstructured mesh is refined to very high resolution of approximately 100m in coastal areas of interest, while it stays relatively coarse in the deep ocean.

A new method for evaluating a limited number of sensor data in a very short time has been developed allowing for a precise situation perspective for near field tsunamis. A large number of pre-computed scenarios (based on earthquake locations and magnitudes) are stored in a database and form the range of assumed tsunami events. In addition for each scenario the respective response functions (deformation vectors) of all ingested GPS stations and the mareograms of all sea level stations are pre-computed and stored for further simulation matching.

Once an event has been detected, incoming sensor measurements are then compared with the pre-calculated scenario and sensor response data. Distinct values such as epicenter location, magnitude, estimated wave height, estimated wave arrival time, and the deformation of the earth's crust at given GPS stations are matched in such a manor to minimize uncertainties. Scenarios with the best overall match give a situation description.

The existing systems for tsunami warning is developed based on actual determined earthquake parameters a matching with pre-calculated scenarios, which allows a prediction of tsunami arrival time and estimation tsunami height for the coastlines area. In principal only a limited number of standard situations can be taken into account with this approach, the closest pre-computed source model does not certainly coincide by location and magnitude with actual seismic observations. Usually early warning systems store a large number of pre-computed tsunami scenarios in a database of virtual tsunamis and then pick-up a scenario with the closest source model. Construction and maintenance of such a huge database is itself a challenging IT and management problem. An alternative way to get rapid simulation results is to run simulations in real time. That is TOAST does.

Beside pre-computed scenarios based on the modeling of TsunAWI, there is TOAST software for real time tsunami simulation. TOAST follows another approach which is based on real time simulation of tsunami propagation. TOAST computes wave propagation of the shallow water equations in linear approximation of the long-wave theory in spherical coordinates. TOAST is applied numerical scheme follows the TUNAMI-F1 algorithm and is leap-frog explicit time-stepping on a finite difference grid. Boundary conditions presume full reflection along shorelines. TOAST does not calculate coastal inundations and detailed runups directly, it brings the tsunami wave until the validity limit of the linear shallow water model then estimates peak coastal tsunami amplitudes with Green's law.

Apart from the warning process the simulation results contribute to the development of inundation (hazard) and risk maps for planning and hazard mitigation to identify vulnerable communities and infrastructures.

2.1.5. Decision Support System

In Indonesia, large tsunami can be generated at any time along a coastline measuring several thousand kilometers and reaching the coast in about 20 – 40 minutes inflicting loss of lives and destruction. Therefore, issuing rapid warning is crucial for the coastal population. As real-time data from the sensor networks provides an assessment of a threatening situation, the overall display of incoming data is a mandatory requirement for the decision making process.

At the national warning center, it has to be determined within minutes, which region is under threat and to what degree the tsunami will have an impact, resulting in an immediate warning to the population and the local governments. The Decision Support System (DSS) visualizes aggregated incoming data from the sensor processing for evaluation and performs a situation analysis making use of pre-calculated tsunami scenarios that have been selected in the simulation system based on the sensor data. Thus the DSS permits a rapid decision making process and

to recommend practical actions. If a decision has been made, the DSS produces individual warning messages and alerts to the regions under an imminent tsunami threat simultaneously issuing emails, facsimile transmissions, SMS and other text messages via all available communication channels and public broadcasting networks to enable potentially affected people to be efficiently informed so that evacuation measures can be initiated.

User interface and process workflows have been designed for decision making under uncertainty and time pressure. Therefore, extensive compilations of geodata, the systems' databases hold pre-processed risk information and scenarios readily available. Interfaces to sensor and dissemination systems are based on standards, which ensure an interoperable and open system. This is important for the generation and dissemination of Indian Ocean Regional Watch Bulletins shared with Indian Ocean rim countries through their national tsunami warning centers.

Geodata sets are essential components of the early warning process as tsunami modeling and scenarios for generating risk maps and evaluation plans are based on them. Data on bathymetry, topography (of the coastal areas) is crucial for tsunami and risk modeling. Administrative, socio-economic, statistical, infrastructure and land-use data are required for risk mapping and form an integral part of DSS inventory.

2.2. Dissemination System

InaTEWS Multi mode of communication system is used for disseminating the tsunami warning included: SMS, email, fax, web, WRS, DVB, and GTS.

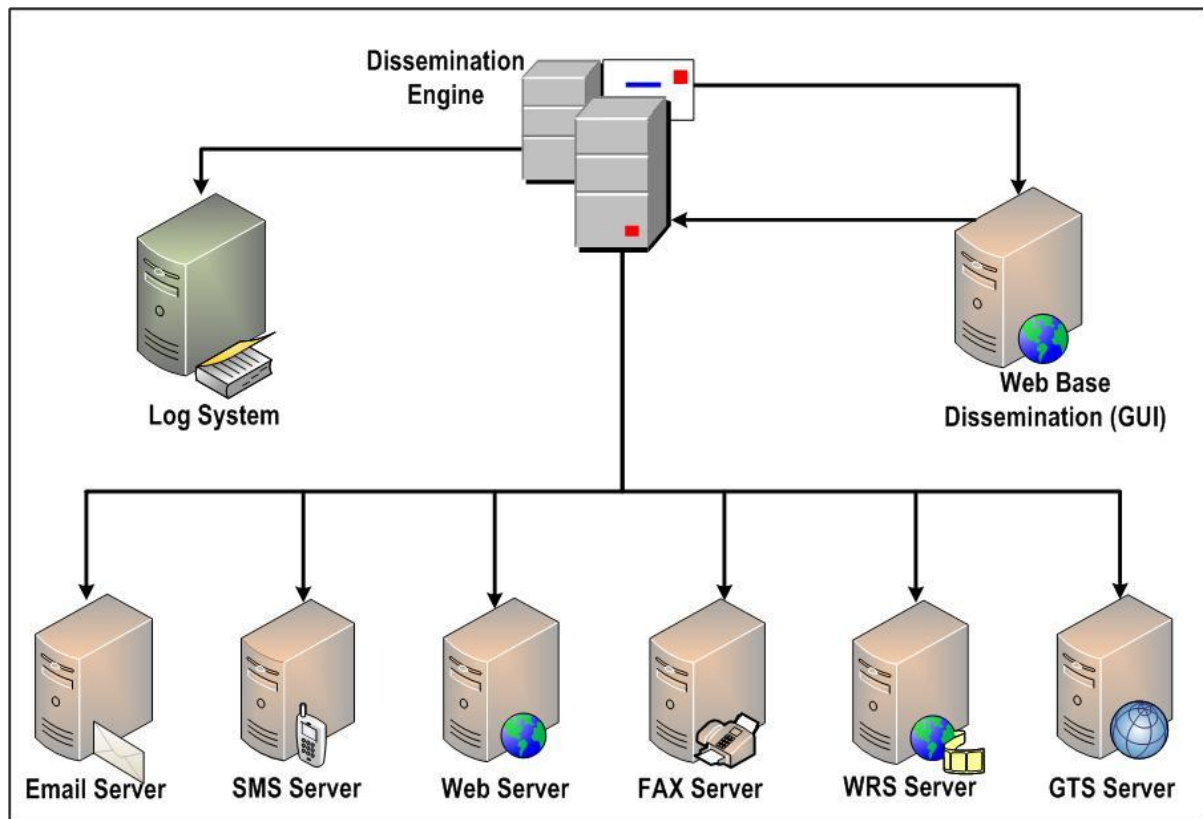


Figure 3 - Diagram of Multi Mode InaTEWS Dissemination System

III. RTSP – Indonesia Service

3.1. Tsunami Threat Threshold

A Tsunami threat is defined to exist if a section of coast is forecast to receive a positive amplitude tsunami wave of 50 cm or more at the offshore water depth of 1 meter.

3.2 Marine Threat Zone and Coastal Forecast Points

The tsunami information provided by RTSPs is structured around a set of geographic zones which have been defined to cover all of the coasts of the Indian Ocean called Marine Threat Zones. The Marine Threat Zones are each generally represented by buffer area that are 50 km wide starting from points that have 30 meter depth near coast to seaward. This buffer zone were divided into segments along the coast and the length of segments were based on administrative boundaries. Indonesia has been applied this warning zone for national tsunami warning purposes that is called Warning

Segments. Although the definition of Warning Segments and Marine Threat Zone is a little bit different but the both are geographical representation of threat areas to which warning will be addressed.

A number of Coastal Forecast Points (CFPs) have been defined between coastal line and Marine Threat Zones. Those are grid points that have value of 1 – 5 meters depth. Deep ocean model and shallow water model were accommodated by using various grid size and unstructured mesh in TsunAWI model. This method allowing stable calculation even in shallow water so that grid points that have depth value such as 10 m – 1 m could be considered as Coastal Forecast Points. The effect is Coastal Forecast Points closer to coastal line and outside The Marine Threat Zone.

The RTSP Bulletins provide tsunami information, such as Estimated Time Arrival (ETA) and Estimated Tsunami High (ETH) for each zone which is forecast to be under threat.

The Marine Threat Zones used by the IOTWS RTSPs are shown in detail at **Figure 4:**

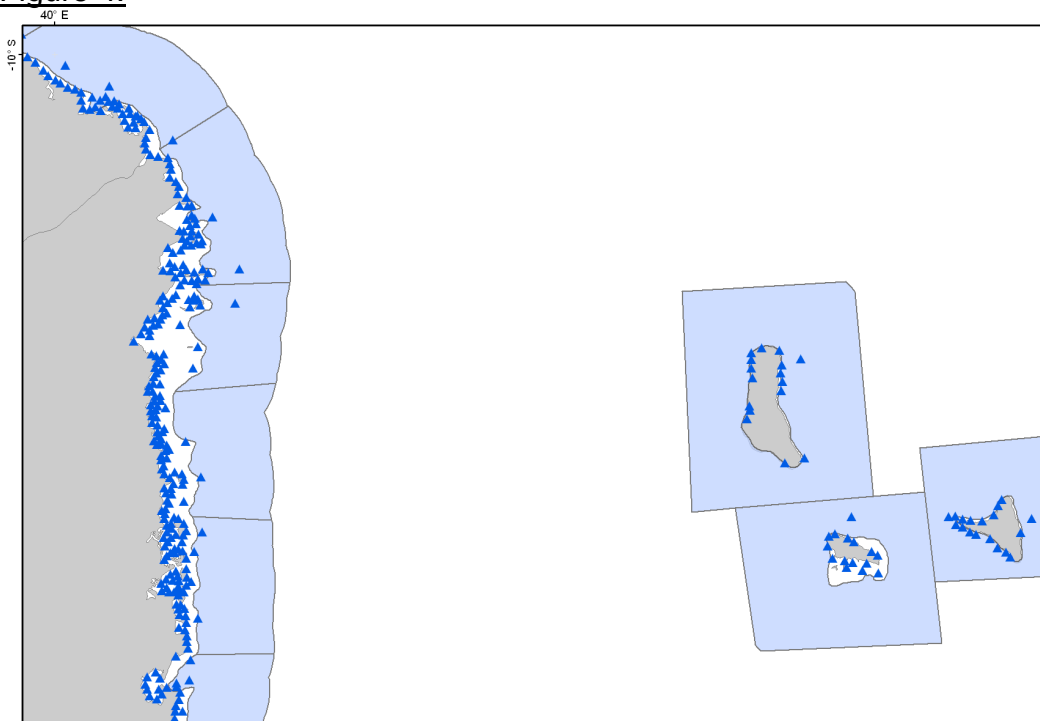


Figure 4 – Marine Threat Zone and Coastal Forecast Points (deep blue) zoomed in Coastal Forecast Points (CFPs) are outside area of Marine Threat Zones (MTZs). Because TsunAWI allowing stable calculation on shallow water. Near small islands the CFPs are inside MTZs because bathymetry surrounding the island are commonly deep (>30 meters).

3.3 RTSP Dissemination Diagram

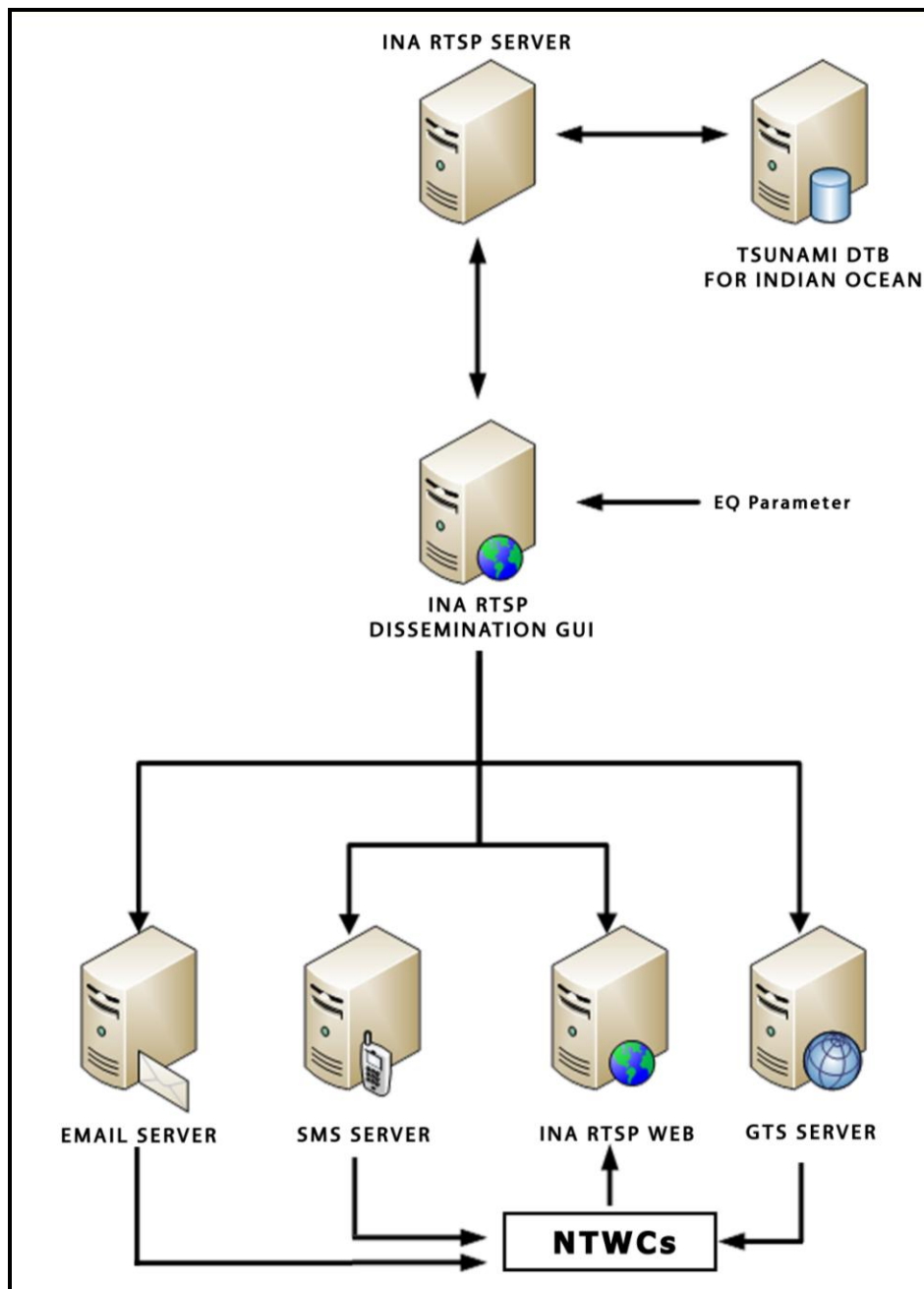


Figure 5 - InaRTSP Dissemination Diagram

3.4 RTSP Bulletins for NTWCs

RTSP-Indonesia will issue bulletin when an earthquake of magnitude 6.5 or greater (Mwp) is detected under the sea in the Indian Ocean, ASEAN countries, Nicobar Islands and Papua New Guinea (PNG), or magnitude 8.0 or greater (Mwp) under the sea in the Pacific Ocean.

The ICG-IOTEWS has agreed that all RTSPs will provide the following four types of Bulletin for National Tsunami warning Centres:

- Bulletins providing details of undersea earthquakes of magnitude 6.5 or greater (Mwp) (referred to as Bulletin type 1)
- Bulletins providing an initial forecast of tsunami threat, including details such as ETA and ETH for each coastal forecast zones under the threat (referred to as Bulletin type 2).
- Bulletins providing update forecasts of tsunami threat, plus information on observed sea-level anomalies (referred to as Bulletin type 3)
- Bulletins providing information on the finalization of the tsunami threat (referred to as Bulletin type 4)

The specific information contained in each type of bulletin comprises of :

Bulletin type 1 – Earthquake Bulletin:

Providing details on earthquakes of magnitude 6.5 or greater (Mwp), which have the potential to generate tsunami. These bulletins contain the earthquake parameters:

- Origin time,
- Epicentre (location),
- Depth, and
- Magnitude.

The bulletin may also provide initial advice as to whether or not the earthquake has the potential to generate a tsunami, based only on earthquake magnitude, epicentre, and depth, pending more detailed tsunami forecasts based on scenario modelling.

Earthquake bulletin will be the first notification of a possible tsunami event for NTWCs which should then monitor RTSP secure websites for further threat information.

Bulletin type 2 – Tsunami Forecast:

Providing an initial forecast of tsunami threat, including details such as ETA and ETH for each coastal zone under threat. This type of bulletin contains either :

- Advice that there is no threat to any coastal zone in the Indian Ocean; or
- Details of the forecast tsunami threat to coastal zones, based on tsunami modelling.

When there is a forecast for a tsunami threat these bulletins contain tsunami model forecasts for each coastal zone of:

- Maximum wave amplitude at the coast at water depth 1 m,
- Time of arrival of first tsunami wave (t_1),

These bulletins will be issued whenever an earthquake of magnitude 6.5 or greater (Mwp) is detected under the sea in the Indian Ocean, ASEAN countries, Nicobar Islands and PNG, or magnitude 8.0 or greater (Mwp) under the sea in the Pacific Ocean. They may also be re-issued if the earthquake source information is updated, or if subsequent new earthquake occurs.

Updated Tsunami Forecast Bulletins will be issued every 15 minutes, if confirmation sea-level observations become available, then tsunami forecast and observation bulletins (type 3) will be issued immediately instead.

Bulletins type 3 – Tsunami Forecast and Observations:

Providing the same information as the Tsunami Forecast Bulletins, with the following additional information on observed sea-level anomalies:

- Location,
- Amplitude, and
- Time

Updates will also be issued immediately if sea-level observations indicate that new coastal zones are under tsunami threat.

Bulletins type 4 –Tsunami Service Finalization:

Providing information on the finalization of advice on the tsunami threat.

3.5 RTSP Public Bulletins

The above products for NTWCs are not intended for public dissemination. Public products from RTSPs will be limited to earthquake parameters and summaries of warnings issued by NTWCs around the Indian Ocean during tsunami event. These summaries will be collated from information provided by NTWCs, and will be made available on an Indian Ocean warning summary webpage.

Public information on tsunami events in the Indian Ocean will be restricted to earthquake details, sea-level observation and a summary of national warning status (as advised by NTWCs to RTSP Indonesia). This information will be available at: <http://rtsp.bmkg.go.id>, click on InaRTSP Public Bulletin icon.

3.6 Service Delivery

The RTSP products are delivered through a number of communications media, as follows :

- Notification messages are sent to NTWCs when RTSP bulletins are issued, via WMO Global Telecommunication System (GTS), e-mail, SMS and fax. The notification messages do not contain bulletin content, since the information is not intended for public dissemination,
- Notification messages distributed through the GTS require identifiers in a specific format. For tsunami messages in the Indian Ocean the defined identifier is WEIO22.
- RTSP bulletins with detailed threat information will be distributed to NTWCs and will be available on password-protected websites maintained by each RTSP.
- Maps and other graphical representation of RTSP information may be made available to NTWCs on password-protected websites maintained

by each RTSP. Examples of RTSP-Indonesia's web pages for NTWC use are shown in Appendix 3.

- Anymore detailed country-specific information or products must be arranged through bilateral agreement between the country requiring the service and an individual RTSP.

APPENDIX 1: DEFINITIONS

CFP	- Coastal Forecast Points, used by RTSPs to define coastal zones under threat
ETA	- Estimated Time Arrival
ETH	- Estimated Tsunami High
GFZ	- GeoForschungs Zentrum, Center for Geosciences of Germany
InaTEWS	- Indonesia Tsunami Early Warning System
IOC	- UNESCO Intergovernmental Oceanographic Commission
IOTWS	- UNESCO IOC Indian Ocean Tsunami Warning System
MTZ	- Marine Threat Zones, used by RTSPs to identify sections of coast under threat
NTWC	- National Tsunami Warning Centre
RTSP	- Regional Tsunami Service Provider
SeisComP	- Seismic Communication Processing developed by GFZ Potsdam
TsunAWI	- Tsunami model developed by Alfred Wegner Institute, Germany
TOAST	- Tsunami Observation And Simulation Terminal

APPENDIX 2: BULLETIN NOTIFICATION EXAMPLES

```
RTSP-InaTEWS-20140909-0006-001
~~~~~
TSUNAMI BULLETIN NOTIFICATION NUMBER 1
issued by the
REGIONAL TSUNAMI SERVICE PROVIDER - RTSP INDONESIA (InaTEWS-BMKG)
~~~~~
issued at 0006 UTC, Tuesday, 09 September 2014
```

```
TO : INDIAN OCEAN NATIONAL TSUNAMI WARNING CENTRES (NTWCs)
FROM: RTSP INDONESIA
```

NOTIFICATION:

RTSP INDONESIA HAS JUST ISSUED TSUNAMI BULLETIN NUMBER 1 FOR THE INDIAN OCEAN, BASED ON THE FOLLOWING EARTHQUAKE EVENT:

EARTHQUAKE INFORMATION (preliminary)

```
Magnitude : 8.7 Mwp
Depth      : 10km
Date       : 09 Sep 2014
Origin Time: 00:00:00 UTC
Latitude   : 10.40S
Longitude  : 112.80E
Location   : South of Java, Indonesia
```

TO VIEW THE BULLETIN GO TO THE RTSP INDONESIA WEBSITE AT:
<http://rtsp.bmkg.go.id>

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:
Indonesia Tsunami Early Warning System (InaTEWS)
METEOROLOGICAL CLIMATOLOGICAL AND GEOPHYSICAL AGENCY (BMKG)
Address: Jl. Angkasa I no.2 Kemayoran, Jakarta, Indonesia, 10720
Tel.: +62 (21) 65867045
Fax: +62 (21) 6546316
P.O. Box 3540 Jakarta
Website: <http://rtsp.bmkg.go.id/publicbull.php>
<http://inatews.bmkg.go.id>
<http://www.bmkg.go.id>
Email : inartsp@bmkg.go.id
monitrtwp@bmkg.go.id

END OF NOTIFICATION MESSAGE

APPENDIX 3: WEB PAGE EXAMPLES

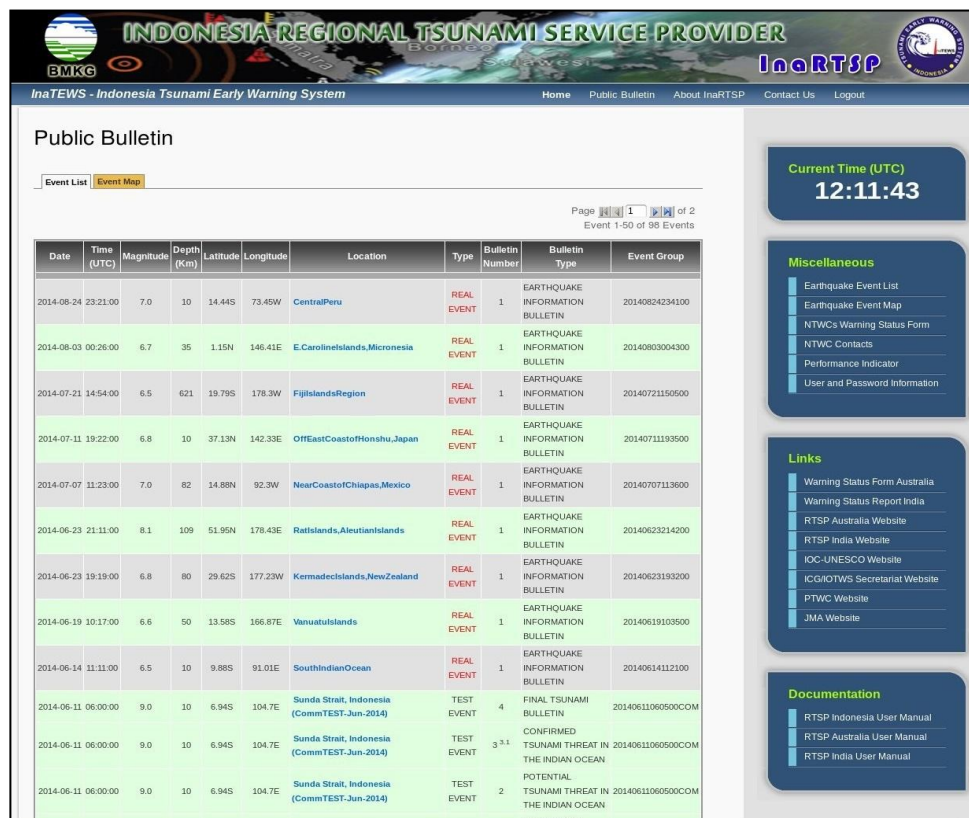


Figure 6 – RTSP-Indonesia’s Web Page Showing Public Bulletin Event List

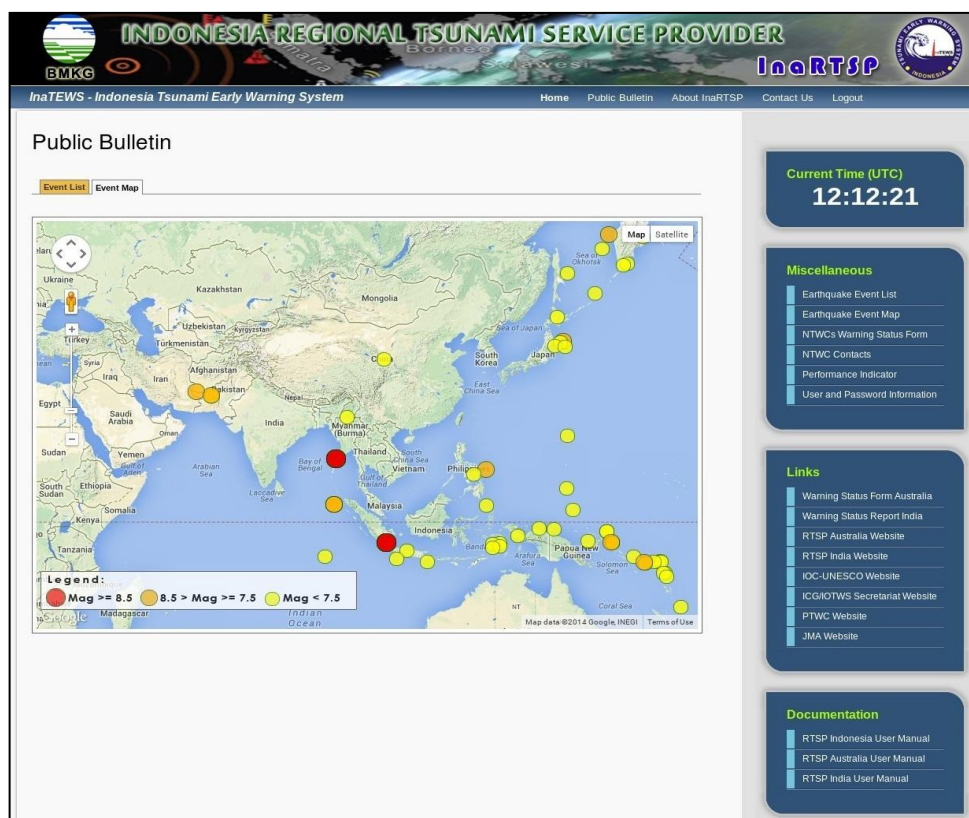


Figure 7 – RTSP Indonesia’s Web Page Showing Public Bulletin Event Map

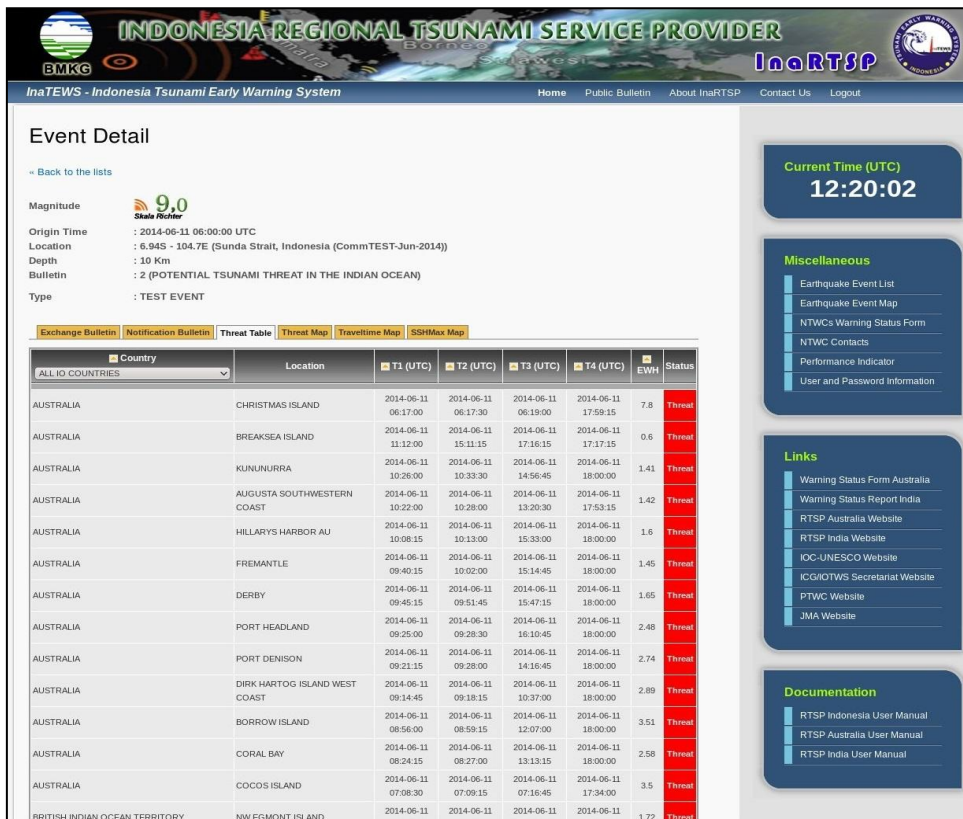


Figure 10 – RTSP Indonesia’s Web Page Showing List of Tsunami Threat Information

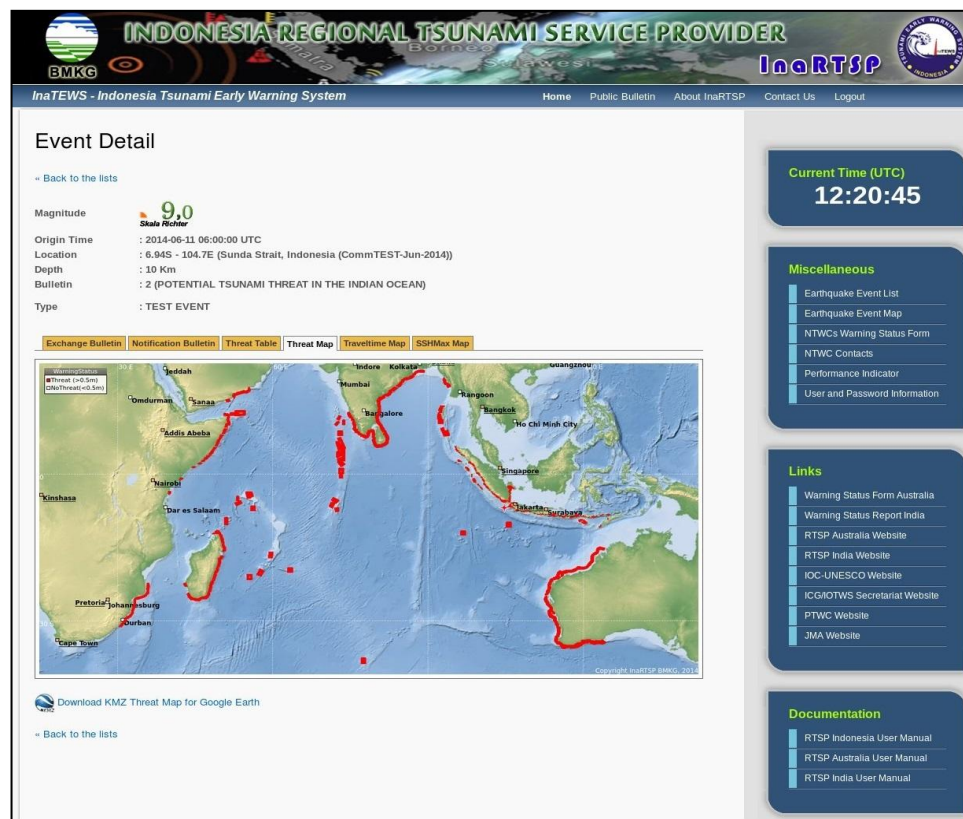


Figure 11 – RTSP Indonesia’s Web Page Showing Map of Tsunami Threat Information

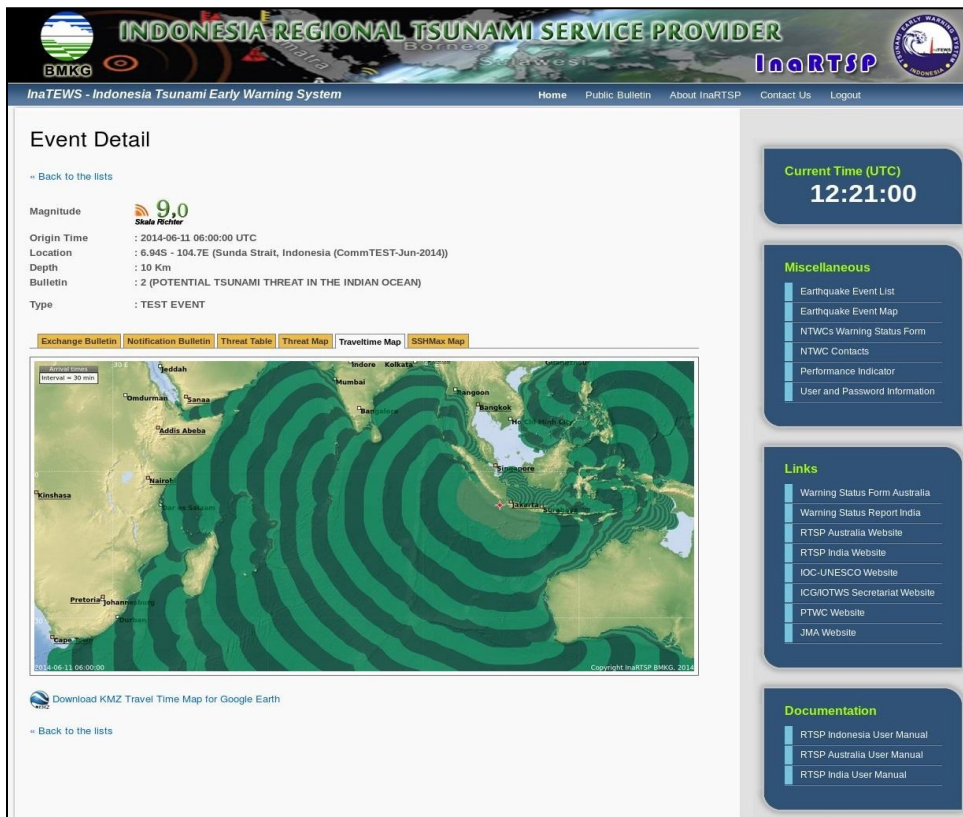


Figure 12 – RTSP Indonesia’s Web Page Showing Map of Tsunami Travel Time

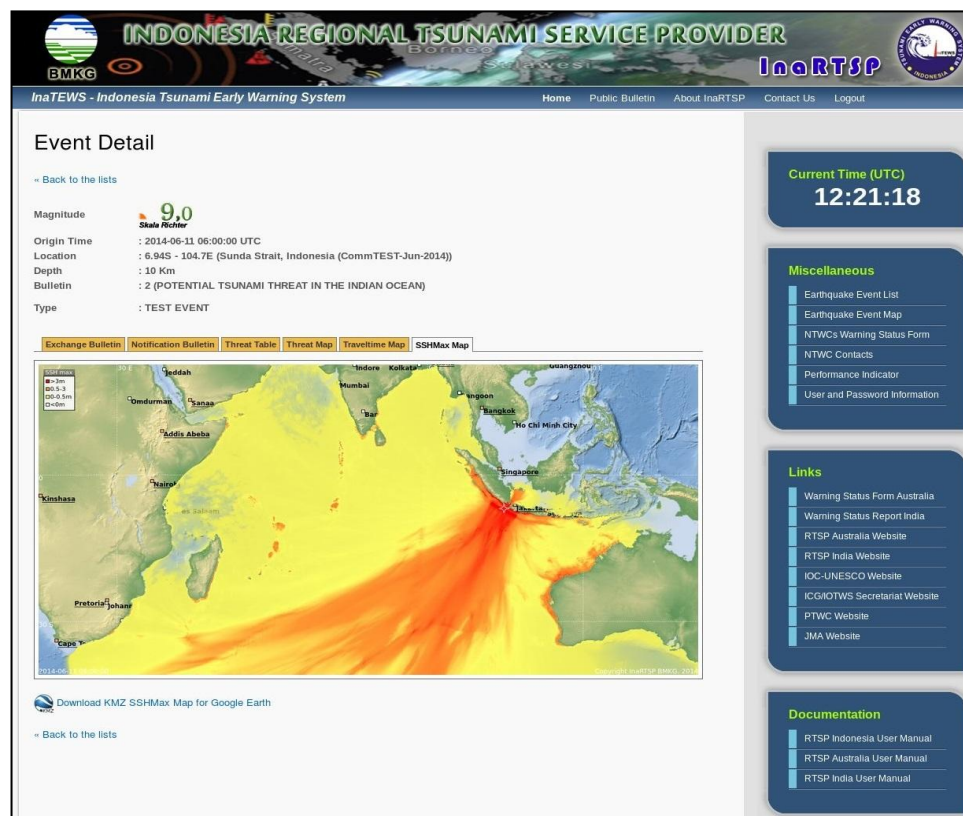


Figure 13 – RTSP Indonesia’s Web Page Showing Map of Sea Surface Height

INDONESIA REGIONAL TSUNAMI SERVICE PROVIDER

InaTEWS - Indonesia Tsunami Early Warning System

Home Public Bulletin About InaRTSP Contact Us Logout

NTWCs Warning Status

[Add New Warning Status Report](#)
Page 1 of 1

Sending Time (UTC) yyyy-mm-dd hh:mm:ss	Country	Sender Name	Threat Status	Comments
2014-08-26 08:34:11	Indonesia	indo-1	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.	tee

[Click here to see status report on csv format!](#)

Current Time (UTC)
12:22:49

Miscellaneous

- [Earthquake Event List](#)
- [Earthquake Event Map](#)
- [NTWCs Warning Status Form](#)
- [NTWC Contacts](#)
- [Performance Indicator](#)
- [User and Password Information](#)

Figure 14 – RTSP Indonesia’s Web Page Showing NTWCs Warning Status Report

INDONESIA REGIONAL TSUNAMI SERVICE PROVIDER

InaTEWS - Indonesia Tsunami Early Warning System

Home Public Bulletin About InaRTSP Contact Us Logout

NTWC Contacts

No	Country	National Tsunami Warning Centre contact details
1	Australia	<p>AUSTRALIA Joint Australian Tsunami Warning Centre (JATWC) http://reg.bom.gov.au/tsunami/rtsp (61)396622182</p> <p>The JATWC comprises two agencies: Geoscience Australia (seismic data analysis) and the Australian Bureau of Meteorology (modeling, sea level data and warnings). The JATWC provides the RTSP services and the national services for Australia (http://www.bom.gov.au/tsunami). Real-time sea level data from Australian managed coastal gauges is available at http://reg.bom.gov.au/reguser/by_user/bornw0418/Operators/Tide_Data/index.shtml with login as bornw0418 and password root04. Fax: (61)396621223. Email: webops@bom.gov.au.</p> <p>Nominated Mobile Phone Numbers: +61 448 532 063, +61 407 789 199, +61 409 411 781, +61 419 166 357, +61 417 122 746, +61 432 579 820, +61 413 356 024</p> <p>mailing address: GPO Box 1289 Melbourne, Vic.3001</p>
2	Bangladesh	<p>BANGLADESH Bangladesh Meteorological Department http://www.bmd.gov.bd/ (880) 2 9135742, (880) 2 9114388 Fax: (880) 28118230. Email: info@bmd.gov.bd, swc@bmd.gov.bd, momenuislam799@hotmail.com</p> <p>Nominated Mobile Phone Number: +88 017 20172495, + 88 017 58464648, +99 017 26310207</p> <p>Mailing address: Bangladesh Meteorological Department Agargaon Dhaka-1207</p>
3	British Indian Ocean Territory	BRITISH INDIAN OCEAN TERRITORY
4	Comoros	<p>COMOROS Centre National de la Recherche Scientifique (269)732064 Mr Hamidi Soule. Fax: (269)733122. Email: hamidsoule@hotmail.com and youssouf.hakim@yahoo.fr</p> <p>mailing address: BP 845 Moroni</p>
5	Djibouti	Djibouti
		FRENCH SOUTHERN AND ANTARCTIC LANDS

Current Time (UTC)
12:22:23

Miscellaneous

- [Earthquake Event List](#)
- [Earthquake Event Map](#)
- [NTWCs Warning Status Form](#)
- [NTWC Contacts](#)
- [Performance Indicator](#)
- [User and Password Information](#)

Links

- [Warning Status Form Australia](#)
- [Warning Status Report India](#)
- [RTSP Australia Website](#)
- [RTSP India Website](#)
- [IOC-UNESCO Website](#)
- [ICG/IOTWS Secretariat Website](#)
- [PTWC Website](#)
- [JMA Website](#)

Documentation

- [RTSP Indonesia User Manual](#)
- [RTSP Australia User Manual](#)
- [RTSP India User Manual](#)

Figure 15 – RTSP Indonesia’s Web Page Showing NTWCs Contacts List

APPENDIX 4: BULLETIN CONTENT EXAMPLES

Bulletin type 1 – Earthquake Bulletins

Notes:

1. Earthquake Bulletins will be issued whenever an earthquake of magnitude 7.5 or greater is detected under the sea in the ASEAN countries, Nicobar Islands and PNG or magnitude 8.0 or greater is detected under the sea in the Pacific Ocean.
2. In addition to earthquake details, Earthquake Bulletin may include an initial statement on tsunamigenic potential based only earthquake magnitude, location and depth, pending more detailed tsunami forecast based on scenario modelling.

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RTSP-InaTEWS-20140909-0006-001
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TSUNAMI BULLETIN NUMBER 1 (TYPE-I)
REGIONAL TSUNAMI SERVICE PROVIDER - RTSP INDONESIA (InaTEWS-BMKG)
issued at 0006 UTC, Tuesday, 09 September 2014
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... EARTHQUAKE INFORMATION BULLETIN ...

1. EARTHQUAKE INFORMATION (preliminary)
RTSP INDONESIA has detected an earthquake with the following
preliminary information:

Magnitude : 8.7 Mwp
Depth : 10km
Date : 09 Sep 2014
Origin Time: 00:00:00 UTC
Latitude : 10.40S
Longitude : 112.80E
Location : South of Java, Indonesia

2. EVALUATION
RTSP INDONESIA is evaluating this earthquake to determine if a tsunami
has been generated.

Further information on this event will be available at:
http://rtsp.bmkg.go.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.
```

4. UPDATES

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

Other RTSPs may issue additional information at:

RTSP AUSTRALIA: <http://reg.bom.gov.au/tsunami/rtsp/>

RTSP INDIA: <http://www.incois.gov.in/Incois/tsunami/eqevents.jsp>

In case of conflicting information from RTSPs or the IAS (PTWC, JMA), the more conservative information should be used for safety.

5. CONTACT INFORMATION

METEOROLOGICAL CLIMATOLOGICAL AND GEOPHYSICAL AGENCY (BMKG)

InaTEWS - Indonesian Tsunami Early Warning System

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

Tel.: +62 (21) 4246321/6546316

Fax: +62 (21) 6546316/4246703

P.O. Box 3540 Jakarta

Website: <http://rtsp.bmkg.go.id/publicbull.php>

<http://www.bmkg.go.id>

<http://inatews.bmkg.go.id>

E-Mail: inartsp@bmkg.go.id

monitrtwp@bmkg.go.id

END OF BULLETIN

Bulletin type 2 – Tsunami Forecast Bulletin

Notes:

1. This type of bulletin contains either:
 - Details of forecast tsunami threat to coastal zones, based on tsunami modelling,
 - Advice that where is no threat to any coastal zone in the Indian Ocean following further analysis of the available information by RTSP.
2. These bulletins will be issued whenever an earthquake of magnitude 7.5 or greater (Mwp) is detected under the sea in ASEAN countries, Nicobar Islands and PNG, or magnitude 8.0 or greater under the sea in Pacific Ocean.
3. Update tsunami forecast bulletin will be issued hourly, if confirmation sea level under the sea observation become available then tsunami forecast and observation bulletin will be issued instead,

RTSP-InaTEWS-20140909-0012-002

TSUNAMI BULLETIN NUMBER 2 (TYPE-II)
REGIONAL TSUNAMI SERVICE PROVIDER - RTSP INDONESIA (InaTEWS-BMKG)
issued at 0012 UTC, Tuesday, 09 September 2014

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

1. EARTHQUAKE INFORMATION (updated)

RTSP INDONESIA has detected an earthquake with the following updated information:

Magnitude : 8.7 Mwp
Depth : 10km
Date : 09 Sep 2014
Origin Time: 00:00:00 UTC
Latitude : 10.40S
Longitude : 112.80E
Location : South of Java, Indonesia

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 RTSP 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, and the amplitude of the maximum beach wave predicted for the zone. Zones where the estimated wave amplitudes are less than 0.5m at the beach are not shown.

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

CHRISTMAS ISLAND	00:43z	09Sep2014	1.13m
COCOS ISLAND	01:59z	09Sep2014	0.76m
CORAL BAY	02:06z	09Sep2014	8.95m
BORROW ISLAND	02:18z	09Sep2014	5.44m
PORT HEADLAND	02:37z	09Sep2014	3.93m
DERBY	02:43z	09Sep2014	2.00m
DIRK HARTOG ISLAND WEST COAST	02:59z	09Sep2014	2.80m
KUNUNURRA	03:19z	09Sep2014	1.10m
PORT DENISON	03:53z	09Sep2014	1.71m
HILLARYS HARBOR AU	04:06z	09Sep2014	0.79m
AUGUSTA SOUTHWESTERN COAST	04:36z	09Sep2014	0.99m
FREMANTLE	05:28z	09Sep2014	0.77m

BRITISH INDIAN OCEAN TERRITORY

DIEGO GARCIA	06:16z	09Sep2014	0.83m
NW EGMONT ISLAND	06:43z	09Sep2014	1.19m
MORESBY ISLAND	10:40z	09Sep2014	0.59m

FRENCH SOUTHERN AND ANTARCTIC LA

LLE SAINT-PAUL	06:33z	09Sep2014	0.91m
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INDIA

KANYAKUMARI	08:53z	09Sep2014	0.72m
KOODANKULAM	10:35z	09Sep2014	0.63m
KAKINADA	10:51z	09Sep2014	0.59m

INDONESIA

JATIM BANYUWANGI BAGIAN SELATAN	00:21z	09Sep2014	8.72m
BALI BADUNG PANTAI-KUTA	00:22z	09Sep2014	5.77m
NTB LOMBOK-BARAT BAGIAN SELATAN	00:23z	09Sep2014	3.46m
JATIM JEMBER PULAU NUSABARUNG	00:24z	09Sep2014	10.17m
BALI KLUNGKUNG PULAU NUSAPENIDA	00:25z	09Sep2014	4.39m
JATIM MALANG	00:25z	09Sep2014	10.41m
JATIM JEMBER	00:25z	09Sep2014	13.90m
JATIM BANYUWANGI BAGIAN TIMUR	00:26z	09Sep2014	4.13m
NTB SUMBAWA BAGIAN BARAT	00:27z	09Sep2014	2.66m
NTB LOMBOK-TENGAH	00:27z	09Sep2014	3.77m
JATIM TRENGGALEK	00:28z	09Sep2014	6.69m
JATIM BLITAR	00:28z	09Sep2014	9.46m
NTB LOMBOK-TIMUR BAGIAN SELATAN	00:30z	09Sep2014	2.80m
NTB SUMBAWA BAGIAN SELATAN	00:31z	09Sep2014	2.49m
JATENG WONOGIRI	00:31z	09Sep2014	4.62m
JATIM TULUNGAGUNG	00:31z	09Sep2014	7.70m
BALI JEMBRANA	00:32z	09Sep2014	4.44m
JATIM PACITAN	00:32z	09Sep2014	6.17m

DIY GUNUNG-KIDUL	00:33z	09Sep2014	5.04m
BALI DENPASAR PANTAI-SANUR	00:34z	09Sep2014	4.02m
BALI KLUNGKUNG	00:34z	09Sep2014	2.85m
BALI KARANG-ASEM BAGIAN SELATAN	00:34z	09Sep2014	4.02m
BALI GIANYAR	00:35z	09Sep2014	3.90m
JATIM LUMAJANG	00:35z	09Sep2014	8.59m
BALI KARANG-ASEM BAGIAN UTARA	00:37z	09Sep2014	1.00m
NTB LOMBOK-BARAT BAGIAN UTARA	00:39z	09Sep2014	1.61m
DIY BANTUL	00:39z	09Sep2014	5.71m
BALI TABANAN	00:39z	09Sep2014	4.09m
NTB LOMBOK-TIMUR BAGIAN TIMUR	00:41z	09Sep2014	2.82m
NTB KOTA-MATARAM	00:41z	09Sep2014	3.46m
DIY KULON-PROGO	00:41z	09Sep2014	4.25m
NTB DOMPU BAGIAN SELATAN	00:45z	09Sep2014	2.38m
JATENG PURWOREJO	00:47z	09Sep2014	3.15m
NTT SUMBA BAGIAN BARAT	00:47z	09Sep2014	2.51m
NTB KOTA-BIMA BAGIAN SELATAN	00:49z	09Sep2014	1.83m
JATENG KEBUMEN	00:49z	09Sep2014	3.41m
JABAR GARUT	00:50z	09Sep2014	2.67m
JABAR CIAMIS	00:51z	09Sep2014	3.19m
JABAR TASIKMALAYA	00:52z	09Sep2014	3.19m
NTT SUMBA BAGIAN TIMUR	00:52z	09Sep2014	2.54m
JABAR CIANJUR SINDANGBARANG	00:53z	09Sep2014	3.08m
JABAR SUKABUMI UJUNG-GENTENG	00:59z	09Sep2014	2.77m
JATENG CILACAP	00:59z	09Sep2014	3.36m
NTT KEPULAUAN MANGGARAI-BARAT	01:00z	09Sep2014	2.17m
NTB BIMA PULAU GILI	01:00z	09Sep2014	1.60m
NTB LOMBOK-TIMUR BAGIAN UTARA	01:08z	09Sep2014	1.38m
NTT MANGGARAI-BARAT BAGIAN SELATAN	01:08z	09Sep2014	1.56m
NTB SUMBAWA BAGIAN UTARA	01:09z	09Sep2014	1.48m
NTT KUPANG	01:09z	09Sep2014	1.83m
BALI BULELENG BAGIAN TIMUR	01:22z	09Sep2014	0.93m
BANTEN PANDEGLANG PULAU PANAITAN	01:34z	09Sep2014	1.50m
JABAR SUKABUMI PELABUHAN-RATU	01:37z	09Sep2014	1.77m
BANTEN PANDEGLANG BAGIAN SELATAN	01:37z	09Sep2014	2.60m
NTB KOTA-BIMA BAGIAN UTARA	01:46z	09Sep2014	1.34m
NTB SUMBAWA	01:53z	09Sep2014	1.23m
BANTEN LEBAK	01:58z	09Sep2014	2.34m
JATIM SUMENEP	02:07z	09Sep2014	0.75m
NTT MANGGARAI BAGIAN SELATAN	02:08z	09Sep2014	1.37m
NTT NGADA BAGIAN SELATAN	02:15z	09Sep2014	1.39m
NTT ROTENDAO	02:16z	09Sep2014	1.49m
LAMPUNG LAMPUNG-SELATAN KEP. LEGUNDI	02:28z	09Sep2014	1.32m
NTB BIMA	02:29z	09Sep2014	1.09m
LAMPUNG LAMPUNG-SELATAN KEP. SEBUKU	02:37z	09Sep2014	2.04m
LAMPUNG LAMPUNG-BARAT PESISIR-TENGAH	02:38z	09Sep2014	1.34m
LAMPUNG LAMPUNG-BARAT PESISIR-UTARA	02:39z	09Sep2014	1.40m
BALI BULELENG BAGIAN BARAT	02:46z	09Sep2014	0.98m
NTT LEMBATA BAGIAN UTARA	02:53z	09Sep2014	2.10m
LAMPUNG LAMPUNG-BARAT PESISIR-SELATAN	02:57z	09Sep2014	2.23m
BANTEN PANDEGLANG BAGIAN UTARA	02:58z	09Sep2014	1.38m
BENGKULU BENGKULU-UTARA PULAU ENGGANO	03:08z	09Sep2014	1.44m
LAMPUNG TANGGAMUS BAGIAN TIMUR	03:11z	09Sep2014	1.50m
NTT ENDE BAGIAN SELATAN	03:12z	09Sep2014	1.12m
LAMPUNG TANGGAMUS BAGIAN BARAT	03:32z	09Sep2014	1.41m

BENGKULU BENGKULU-SELATAN	03:34z	09Sep2014	1.19m
LAMPUNG TANGGAMUS PULAU TABUAN	03:39z	09Sep2014	1.36m
NTT FLORES-TIMUR PULAU ADONARA	03:45z	09Sep2014	1.28m
BANTEN SERANG BAGIAN BARAT	03:46z	09Sep2014	1.48m
BENGKULU KAUR	03:48z	09Sep2014	1.36m
LAMPUNG LAMPUNG-SELATAN KEP. KRAKATAU	03:53z	09Sep2014	1.58m
NTT FLORES-TIMUR PULAU SOLOR	04:04z	09Sep2014	0.94m
NTT KOTA-KUPANG	04:17z	09Sep2014	1.20m
JATIM SITUBONDO	04:19z	09Sep2014	0.83m
NTT TIMOR-TENGAH-UTARA	04:28z	09Sep2014	0.88m
NTT ALOR BAGIAN SELATAN	04:28z	09Sep2014	0.71m
NTT SIKKA BAGIAN SELATAN	04:31z	09Sep2014	0.97m
NTT BELU BAGIAN UTARA	04:37z	09Sep2014	0.87m
NTT FLORES-TIMUR BAGIAN SELATAN	05:08z	09Sep2014	0.97m
NTT LEMBATA BAGIAN SELATAN	05:19z	09Sep2014	0.77m
BENGKULU KOTA-BENGKULU PANTAI-PANJANG	05:58z	09Sep2014	0.81m
BENGKULU SELUMA	06:21z	09Sep2014	1.28m
SUMBAR KEPULAUAN-MENTAWAI KEP. PAGAI	06:23z	09Sep2014	1.33m
NTB DOMPU BAGIAN BARAT	06:37z	09Sep2014	0.70m
BENGKULU BENGKULU-UTARA BAGIAN SELATAN	07:01z	09Sep2014	0.73m
LAMPUNG LAMPUNG-SELATAN KALIANDA	07:11z	09Sep2014	0.94m
NTT TIMOR-TENGAH-SELATAN	07:14z	09Sep2014	0.91m
LAMPUNG KOTA-BANDAR-LAMPUNG PANTAI PANJANG	07:17z	09Sep2014	0.89m
LAMPUNG LAMPUNG-SELATAN BAKAUHENI	08:04z	09Sep2014	1.28m
BANTEN KOTA-CILEGON PULAU SANGIA	08:05z	09Sep2014	0.78m
BENGKULU BENGKULU-UTARA BAGIAN UTARA	08:47z	09Sep2014	0.85m
NTT MANGGARAI-BARAT BAGIAN UTARA	09:10z	09Sep2014	0.62m
NTB DOMPU BAGIAN UTARA	10:03z	09Sep2014	0.76m
LAMPUNG LAMPUNG-SELATAN BAGIAN BARAT	10:08z	09Sep2014	0.99m
NTT ALOR BAGIAN UTARA	10:16z	09Sep2014	0.71m
SUMBAR KEPULAUAN-MENTAWAI P. SIBERUT	10:25z	09Sep2014	0.76m
SUMUT NIAS BAGIAN BARAT	10:30z	09Sep2014	0.60m
BANTEN KOTA-CILEGON	10:45z	09Sep2014	0.79m
NTB BIMA PULAU SANGIANG	11:08z	09Sep2014	0.69m
BENGKULU MUKOMUKO	11:32z	09Sep2014	0.73m

MADAGASCAR

MANAKARA	09:45z	09Sep2014	1.20m
FARAFAGANA	10:09z	09Sep2014	1.03m
ANTANANARIVO	10:31z	09Sep2014	1.07m
VANGAINDRANO	10:41z	09Sep2014	1.19m
SOANIERANA-IVONGO	10:42z	09Sep2014	0.65m
MANANTENINA	10:45z	09Sep2014	0.96m
FENOARIVO AT SINANANA	10:49z	09Sep2014	0.61m
AMBAHY	11:19z	09Sep2014	1.11m
NAMORONA	11:19z	09Sep2014	0.70m
TRANOVAHO	11:36z	09Sep2014	0.69m
AMBINANINONY	11:36z	09Sep2014	0.69m
TOAMASINA AIRPORT	11:36z	09Sep2014	0.79m
TOAMASINA	11:53z	09Sep2014	0.73m
TOLANARO	11:59z	09Sep2014	0.73m

MALDIVES

KULHUDHUFFUSHI	07:19z 09Sep2014	0.82m
THINADHOO	07:35z 09Sep2014	0.77m
KOLHUFUSHI	07:48z 09Sep2014	0.73m
HITHADHOO	07:57z 09Sep2014	0.62m
DHIYAMIGILI	08:29z 09Sep2014	0.71m
MALE	11:00z 09Sep2014	0.63m

MAURITIUS

LA FERME	07:43z 09Sep2014	1.21m
GRANDE REVIERE SUD EST	09:10z 09Sep2014	0.69m
CARGADOS CARAJOS	10:00z 09Sep2014	0.70m

OMAN

SALALAH	11:38z 09Sep2014	0.83m
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REUNION

SAINT - JOSEPH	08:38z 09Sep2014	0.66m
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SRI LANKA

HIKKADUWA	06:46z 09Sep2014	0.75m
MATARA	07:25z 09Sep2014	1.03m
POTTUVIL	07:54z 09Sep2014	1.06m
YALA	07:58z 09Sep2014	0.91m
COLOMBO	09:09z 09Sep2014	1.03m
KATTANKUDI	10:17z 09Sep2014	0.63m

TIMOR-LESTE

DILI	04:41z 09Sep2014	0.83m
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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 RTSP INDONESIA for this event as more information becomes available.

Other RTSPs may issue additional information at:

RTSP AUSTRALIA: <http://reg.bom.gov.au/tsunami/rtsp/>

RTSP INDIA: <http://www.incois.gov.in/Incois/tsunami/eqevents.jsp>

In case of conflicting information from RTSPs or the IAS (PTWC, JMA), the more conservative information should be used for safety.

6. CONTACT INFORMATION

METEOROLOGICAL CLIMATOLOGICAL AND GEOPHYSICAL AGENCY (BMKG)

InaTEWS - Indonesian Tsunami Early Warning System

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

Tel.: +62 (21) 4246321/6546316

Fax: +62 (21) 6546316/4246703

P.O. Box 3540 Jakarta

Website: <http://rtsp.bmkg.go.id/publicbull.php>

<http://www.bmkg.go.id>

<http://inatews.bmkg.go.id>

E-Mail: inartsp@bmkg.go.id

monitrtwp@bmkg.go.id

END OF BULLETIN

Bulletin type 3 – Tsunami Forecast and observations Bulletin

Notes:

1. This type of bulletin is similar to tsunami forecast bulletins (bulletin type 2), but includes information on observed sea level anomalies due to tsunami.
2. Update tsunami forecast and observations bulletins will be issued hourly, update will also be issued immediately if sea-level observations indicate that new coastal zones are under tsunami threat.

RTSP-InaTEWS-20140909-0040-003

TSUNAMI BULLETIN NUMBER 3 (TYPE-III)

REGIONAL TSUNAMI SERVICE PROVIDER - RTSP INDONESIA (InaTEWS-BMKG)

issued at 0040 UTC, Tuesday, 09 September 2014

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

1. EARTHQUAKE INFORMATION (updated)

RTSP INDONESIA has detected an earthquake with the following updated information:

Magnitude : 8.8 Mwp

Depth : 10km

Date : 09 Sep 2014

Origin Time: 00:00:00 UTC

Latitude : 10.40S

Longitude : 112.80E

Location : South of Java, Indonesia

2. EVALUATION

Sea level observations have confirmed that a TSUNAMI WAS GENERATED.
Maximum wave amplitudes observed so far:

LOCATION	COUNTRIES	LAT	LON	AMPL(m)	TIME(UTC)	DATE
Sadeng	Indonesia	8.19S	110.80E	3.00	00:32	Sept 9,2014
Prigi	Indonesia	8.28S	111.73E	3.00	00:35	Sept 9,2014

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, and the amplitude of the maximum beach wave predicted for the zone. Zones where the estimated wave amplitudes are less than 0.5m at the beach are not shown.

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

CHRISTMAS ISLAND	00:39z	09Sep2014	1.36m
COCOS ISLAND	01:56z	09Sep2014	0.92m
CORAL BAY	02:05z	09Sep2014	11.16m
BORROW ISLAND	02:16z	09Sep2014	6.49m
PORT HEADLAND	02:35z	09Sep2014	4.37m
DERBY	02:40z	09Sep2014	2.49m
DIRK HARTOG ISLAND WEST COAST	02:58z	09Sep2014	3.07m
PORT DENISON	03:10z	09Sep2014	2.26m
KUNUNURRA	03:15z	09Sep2014	1.11m
HILLARYS HARBOR AU	03:56z	09Sep2014	1.00m
FREMANTLE	04:24z	09Sep2014	0.94m
AUGUSTA SOUTHWESTERN COAST	04:35z	09Sep2014	1.25m

BRITISH INDIAN OCEAN TERRITORY

DIEGO GARCIA	06:17z	09Sep2014	0.98m
NW EGMONT ISLAND	06:35z	09Sep2014	1.17m

MORESBY ISLAND	07:17z	09Sep2014	0.68m

FRENCH SOUTHERN AND ANTARCTIC LA			

LLE SAINT-PAUL	06:53z	09Sep2014	0.96m

INDIA			

KANYAKUMARI	10:26z	09Sep2014	0.74m
ALLEPPEY ALAPPUZHA	10:26z	09Sep2014	0.65m
KOODANKULAM	10:35z	09Sep2014	0.65m
KAKINADA	10:50z	09Sep2014	0.62m
MACHILIPATNAM	11:26z	09Sep2014	0.63m

INDONESIA			

BALI BADUNG PANTAI-KUTA	00:21z	09Sep2014	7.43m
NTB LOMBOK-BARAT BAGIAN SELATAN	00:21z	09Sep2014	4.68m
JATIM BANYUWANGI BAGIAN SELATAN	00:21z	09Sep2014	10.10m
JATIM JEMBER PULAU NUSABARUNG	00:23z	09Sep2014	11.40m
BALI KLUNGKUNG PULAU NUSAPENIDA	00:24z	09Sep2014	6.09m
NTB SUMBAWA BAGIAN BARAT	00:24z	09Sep2014	3.71m
JATIM MALANG	00:25z	09Sep2014	11.18m
JATIM JEMBER	00:25z	09Sep2014	14.29m
NTB LOMBOK-TENGAH	00:25z	09Sep2014	4.27m
JATIM BANYUWANGI BAGIAN TIMUR	00:25z	09Sep2014	5.46m
JATIM TRENGGALEK	00:28z	09Sep2014	7.82m
JATIM BLITAR	00:28z	09Sep2014	10.20m
NTB LOMBOK-TIMUR BAGIAN SELATAN	00:28z	09Sep2014	3.29m
NTB SUMBAWA BAGIAN SELATAN	00:29z	09Sep2014	2.90m
JATENG WONOGIRI	00:30z	09Sep2014	6.88m
JATIM TULUNGAGUNG	00:31z	09Sep2014	9.07m
BALI JEMBRANA	00:31z	09Sep2014	5.30m
JATIM PACITAN	00:32z	09Sep2014	7.72m
BALI KLUNGKUNG	00:32z	09Sep2014	3.80m
DIY GUNUNG-KIDUL	00:32z	09Sep2014	7.50m
BALI KARANG-ASEM BAGIAN SELATAN	00:32z	09Sep2014	4.85m
BALI DENPASAR PANTAI-SANUR	00:32z	09Sep2014	5.08m
BALI GIANYAR	00:33z	09Sep2014	4.97m
JATIM LUMAJANG	00:35z	09Sep2014	8.76m
BALI KARANG-ASEM BAGIAN UTARA	00:35z	09Sep2014	1.16m
NTB LOMBOK-BARAT BAGIAN UTARA	00:38z	09Sep2014	1.93m
DIY BANTUL	00:38z	09Sep2014	6.93m
BALI TABANAN	00:39z	09Sep2014	5.47m
NTB LOMBOK-TIMUR BAGIAN TIMUR	00:39z	09Sep2014	3.66m
DIY KULON-PROGO	00:39z	09Sep2014	5.24m
NTB KOTA-MATARAM	00:39z	09Sep2014	4.68m
NTB DOMPU BAGIAN SELATAN	00:43z	09Sep2014	2.83m
NTT SUMBA BAGIAN BARAT	00:45z	09Sep2014	2.85m
JATENG PURWOREJO	00:45z	09Sep2014	3.77m
NTB KOTA-BIMA BAGIAN SELATAN	00:46z	09Sep2014	2.16m
JATENG KEBUMEN	00:47z	09Sep2014	4.91m

JABAR GARUT	00:47z	09Sep2014	3.42m
JABAR TASIKMALAYA	00:48z	09Sep2014	3.90m
JABAR CIAMIS	00:49z	09Sep2014	3.89m
NTT SUMBA BAGIAN TIMUR	00:49z	09Sep2014	2.90m
JABAR CIANJUR SINDANGBARANG	00:51z	09Sep2014	3.53m
NTB LOMBOK-TIMUR BAGIAN UTARA	00:52z	09Sep2014	1.60m
JABAR SUKABUMI UJUNG-GENTENG	00:55z	09Sep2014	3.75m
JATENG CILACAP	00:57z	09Sep2014	4.20m
NTT KEPULAUAN MANGGARAI-BARAT	00:57z	09Sep2014	2.79m
NTB BIMA PULAU GILI	00:58z	09Sep2014	1.97m
JATIM SUMENEP	01:00z	09Sep2014	1.00m
JABAR SUKABUMI PELABUHAN-RATU	01:03z	09Sep2014	1.96m
BANTEN PANDEGLANG BAGIAN SELATAN	01:05z	09Sep2014	2.86m
NTB SUMBAWA BAGIAN UTARA	01:05z	09Sep2014	1.96m
NTT MANGGARAI-BARAT BAGIAN SELATAN	01:06z	09Sep2014	2.17m
NTT KUPANG	01:06z	09Sep2014	1.89m
BANTEN LEBAK	01:07z	09Sep2014	2.40m
BALI BULELENG BAGIAN TIMUR	01:16z	09Sep2014	1.01m
NTT ROTENDAO	01:19z	09Sep2014	1.69m
NTT MANGGARAI BAGIAN SELATAN	01:21z	09Sep2014	1.67m
BANTEN PANDEGLANG PULAU PANAITAN	01:24z	09Sep2014	1.96m
BALI BULELENG BAGIAN BARAT	01:30z	09Sep2014	1.02m
NTB KOTA-BIMA BAGIAN UTARA	01:43z	09Sep2014	1.57m
NTB SUMBAWA	01:52z	09Sep2014	1.33m
NTT NGADA BAGIAN SELATAN	02:13z	09Sep2014	1.50m
LAMPUNG LAMPUNG-SELATAN KEP. LEGUNDI	02:21z	09Sep2014	1.86m
NTB BIMA	02:22z	09Sep2014	1.38m
NTT ENDE BAGIAN SELATAN	02:23z	09Sep2014	1.27m
LAMPUNG TANGGAMUS BAGIAN TIMUR	02:25z	09Sep2014	1.85m
LAMPUNG LAMPUNG-BARAT PESISIR-SELATAN	02:29z	09Sep2014	2.42m
LAMPUNG LAMPUNG-SELATAN KEP. KRAKATAU	02:31z	09Sep2014	1.97m
LAMPUNG LAMPUNG-BARAT PESISIR-UTARA	02:33z	09Sep2014	1.49m
LAMPUNG LAMPUNG-SELATAN KEP. SEBUKU	02:34z	09Sep2014	2.33m
BENGKULU BENGKULU-UTARA PULAU ENGGANO	02:34z	09Sep2014	2.11m
LAMPUNG LAMPUNG-BARAT PESISIR-TENGAH	02:37z	09Sep2014	1.40m
NTT FLORES-TIMUR PULAU SOLOR	02:43z	09Sep2014	1.00m
NTT KOTA-KUPANG	02:46z	09Sep2014	1.80m
NTT LEMBATA BAGIAN UTARA	02:52z	09Sep2014	2.28m
BANTEN PANDEGLANG BAGIAN UTARA	02:55z	09Sep2014	1.94m
BENGKULU KAUR	03:04z	09Sep2014	1.61m
LAMPUNG TANGGAMUS PULAU TABUAN	03:07z	09Sep2014	1.37m
BENGKULU SELUMA	03:07z	09Sep2014	1.63m
BENGKULU BENGKULU-SELATAN	03:29z	09Sep2014	1.53m
LAMPUNG TANGGAMUS BAGIAN BARAT	03:30z	09Sep2014	1.79m
NTT SIKKA BAGIAN SELATAN	03:40z	09Sep2014	1.13m
NTT ALOR BAGIAN SELATAN	03:44z	09Sep2014	0.81m
BANTEN SERANG BAGIAN BARAT	03:44z	09Sep2014	1.66m
JATIM SITUBONDO	03:49z	09Sep2014	0.91m
NTT FLORES-TIMUR PULAU ADONARA	04:02z	09Sep2014	1.49m
NTT LEMBATA BAGIAN SELATAN	04:24z	09Sep2014	0.93m
NTT TIMOR-TENGAH-UTARA	04:26z	09Sep2014	1.15m
NTT BELU BAGIAN UTARA	04:34z	09Sep2014	1.12m
NTB DOMPU BAGIAN UTARA	04:39z	09Sep2014	0.81m
NTT TIMOR-TENGAH-SELATAN	04:55z	09Sep2014	0.97m
NTT FLORES-TIMUR BAGIAN SELATAN	05:25z	09Sep2014	0.99m

LAMPUNG LAMPUNG-SELATAN KALIANDA	05:54z	09Sep2014	1.17m
BENGKULU KOTA-BENGKULU PANTAI-PANJANG	05:56z	09Sep2014	0.85m
SUMBAR KEPULAUAN-MENTAWAI KEP. PAGAI	06:20z	09Sep2014	1.49m
BENGKULU BENGKULU-UTARA BAGIAN SELATAN	06:29z	09Sep2014	1.01m
NTB DOMPU BAGIAN BARAT	06:35z	09Sep2014	0.80m
LAMPUNG LAMPUNG-SELATAN BAKAUHENI	06:38z	09Sep2014	1.50m
NTT ALOR BAGIAN UTARA	06:45z	09Sep2014	0.81m
BENGKULU BENGKULU-UTARA BAGIAN UTARA	07:10z	09Sep2014	1.03m
LAMPUNG KOTA-BANDAR-LAMPUNG PANTAI PANJANG	07:16z	09Sep2014	0.95m
BANTEN KOTA-CILEGON PULAU SANGIA	07:22z	09Sep2014	0.89m
JATIM PAMEKASAN	07:42z	09Sep2014	0.79m
NTB BIMA PULAU SANGIANG	07:45z	09Sep2014	0.80m
SUMBAR KEPULAUAN-MENTAWAI PULAU SIPORA	08:26z	09Sep2014	0.61m
NTT MANGGARAI-BARAT BAGIAN UTARA	08:52z	09Sep2014	0.61m
SULSEL TAKALAR	09:01z	09Sep2014	0.61m
SULSEL MAROS	09:05z	09Sep2014	0.74m
LAMPUNG LAMPUNG-SELATAN BAGIAN BARAT	09:08z	09Sep2014	1.12m
SUMUT NIAS-SELATAN PULAU TANABALA	09:42z	09Sep2014	0.70m
SUMUT NIAS BAGIAN BARAT	09:47z	09Sep2014	0.73m
KALSEL KOTABARU	10:00z	09Sep2014	0.64m
SUMBAR KEPULAUAN-MENTAWAI P. SIBERUT	10:24z	09Sep2014	0.79m
SULSEL SELAYAR	10:32z	09Sep2014	0.58m
SUMUT NIAS-SELATAN PULAU NIAS	10:40z	09Sep2014	0.66m
BANTEN KOTA-CILEGON	10:44z	09Sep2014	0.96m
BENGKULU MUKOMUKO	10:55z	09Sep2014	0.96m
SUMBAR PESISIR-SELATAN BAGIAN SELATAN	11:24z	09Sep2014	0.68m

MADAGASCAR			

MANAKARA	09:44z	09Sep2014	0.93m
SOANIERANA-IVONGO	09:57z	09Sep2014	0.74m
NAMORONA	10:01z	09Sep2014	0.79m
ANTANANARIVO	10:02z	09Sep2014	1.10m
FARAFAGANA	10:07z	09Sep2014	1.19m
RATSINANARANA	10:31z	09Sep2014	0.59m
VANGAINDRANO	10:40z	09Sep2014	1.20m
FARAHALANA	10:43z	09Sep2014	0.59m
MANANTENINA	10:45z	09Sep2014	1.20m
FENOARIVO AT SINANANA	10:47z	09Sep2014	0.81m
AMBINANINONY	10:47z	09Sep2014	0.87m
AMBAHY	10:48z	09Sep2014	1.39m
TRANOVAHO	11:35z	09Sep2014	0.68m
TOAMASINA AIRPORT	11:36z	09Sep2014	0.82m
SAMPONA	11:41z	09Sep2014	0.67m
TOAMASINA	11:52z	09Sep2014	0.86m
TOLANARO	11:58z	09Sep2014	0.89m

MALDIVES			

KOLHUFUSHI	06:48z	09Sep2014	0.84m
THINADHOO	06:53z	09Sep2014	1.03m
KULHUDHUFFUSHI	07:19z	09Sep2014	1.11m
DHIYAMIGILI	07:41z	09Sep2014	0.92m

HITHADHOO	07:54z	09Sep2014	0.85m
MALE	10:29z	09Sep2014	0.67m
GOIDHOO	11:45z	09Sep2014	0.58m

MAURITIUS

LA FERME	07:50z	09Sep2014	1.28m
GRANDE REVIERE SUD EST	08:39z	09Sep2014	0.98m
CARGADOS CARAJOS	09:44z	09Sep2014	0.80m

OMAN

SALALAH	11:37z	09Sep2014	0.77m
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REUNION

SAINT - JOSEPH	08:39z	09Sep2014	0.78m
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SRI LANKA

MATARA	07:12z	09Sep2014	1.03m
POTTUVIL	07:35z	09Sep2014	1.16m
YALA	07:57z	09Sep2014	1.14m
KATTANKUDI	08:06z	09Sep2014	0.79m
HIKKADUWA	08:38z	09Sep2014	0.84m
COLOMBO	09:37z	09Sep2014	1.44m
ANAITIVU	11:11z	09Sep2014	0.69m
PULMODDAI	11:22z	09Sep2014	0.65m
CHUNDIKKULAM	11:34z	09Sep2014	0.65m

TIMOR-LESTE

DILI	04:38z	09Sep2014	0.96m
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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 RTSP INDONESIA for this event as more information becomes available.

Other RTSPs may issue additional information at:

RTSP AUSTRALIA: <http://reg.bom.gov.au/tsunami/rtsp/>

RTSP INDIA: <http://www.incois.gov.in/Incois/tsunami/eqevents.jsp>

In case of conflicting information from RTSPs or the IAS (PTWC, JMA), the more conservative information should be used for safety.

6. CONTACT INFORMATION

METEOROLOGICAL CLIMATOLOGICAL AND GEOPHYSICAL AGENCY (BMKG)

InaTEWS - Indonesian Tsunami Early Warning System

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

Tel.: +62 (21) 4246321/6546316

Fax: +62 (21) 6546316/4246703

P.O. Box 3540 Jakarta

Website: <http://rtsp.bmkg.go.id/publicbull.php>

<http://www.bmkg.go.id>

<http://inatews.bmkg.go.id>

E-Mail: inartsp@bmkg.go.id

monitrtwp@bmkg.go.id

END OF BULLETIN

Bulletin type 4 – Tsunami Service Finalization Bulletin

Notes:

1. RTSP-Indonesia will finalize the issuing of bulletins for an event by issuing a tsunami service finalization bulletin.
2. This type of bulletin will be issued 2 hours after the last forecast arrival time in any Indian Ocean coastal zone of tsunami wave of amplitude 50 cm or greater (t4 plus 2 hours).

RTSP-InaTEWS-20140909-1400-011

TSUNAMI BULLETIN NUMBER 11 (TYPE-IV)

REGIONAL TSUNAMI SERVICE PROVIDER - RTSP INDONESIA (InaTEWS-BMKG)

issued at 1400 UTC, Tuesday, 09 September 2014

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

1. EARTHQUAKE INFORMATION

RTSP INDONESIA has detected an earthquake with the following FINAL information:

Magnitude : 8.8 Mwp

Depth : 10km

Date : 09 Sep 2014

Origin Time: 00:00:00 UTC

Latitude : 10.40S

Longitude : 112.80E

Location : South of Java, Indonesia

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 RTSP INDONESIA modeling.

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	COUNTRIES	LAT	LON	AMPL(m)	TIME(UTC)	DATE
Sadeng	Indonesia	8.19S	110.80E	6.00	00:34	Sept 9,2014
Prigi	Indonesia	8.28S	111.73E	8.00	00:49	Sept 9,2014
Pt Murat	Australia	21.82S	114.19E	8.00	02:40	Sept 9,2014
Enggano	Indonesia	5.35S	102.28E	1.00	06:00	Sept 9,2014
Cup Cuvier	Australia	24.22S	113.40E	3.50	05:30	Sept 9,2014
Cocos Island	Australia	12.12S	96.89E	0.50	05:00	Sept 9,2014
Broom	Australia	18.00S	122.22E	1.00	10:20	Sept 9,2014
Rodrigues	Mauritius	19.68S	63.42E	1.00	11:00	Sept 9,2014
Male	Maldive	4.19N	73.53E	0.50	11:00	Sept 9,2014
Toamasina	Madagascar	18.15S	14.43E	0.50	11:40	Sept 9,2014
Salalah	Oman	16.93N	54.01E	0.50	11:44	Sept 9,2014

4. ADVICE

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5. UPDATES

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Tel.: +62 (21) 4246321/6546316
Fax: +62 (21) 6546316/4246703
P.O. Box 3540 Jakarta
Website: <http://rtsp.bmkg.go.id/publicbull.php>
<http://www.bmkg.go.id>
<http://inatews.bmkg.go.id>
E-Mail: inartsp@bmkg.go.id
monitrtwp@bmkg.go.id

END OF BULLETIN

APPENDIX 5: COMMUNICATIONS

Notification Messages:

RTSP-Indonesia will issue notification message to National Tsunami Warning Centre whenever a Bulletin is issued. Notification message will be disseminated via the WMO Global Telecommunication System (GTS), email, fax and SMS.

NTWCs should advise RSTP-Indonesia of their preference mode of delivery and address details.

Notification message are intended to alert NTWCs to the availability of RTSP Bulletin, and will not contain tsunami forecast details.

Web:

The full of all Bulletins, plus some map and graphical product will be available to NTWCs on password-protected website :

<http://rtsp.bmkg.go.id>

The password for this site is provided to National Tsunami Warning Focal Points.

E-mail:

NTWCs can contact RTSP-Indonesia via e-mail at:

inartsp@bmkg.go.id

monitrtwp@bmkg.go.id