Intergovernmental Oceanographic Commission
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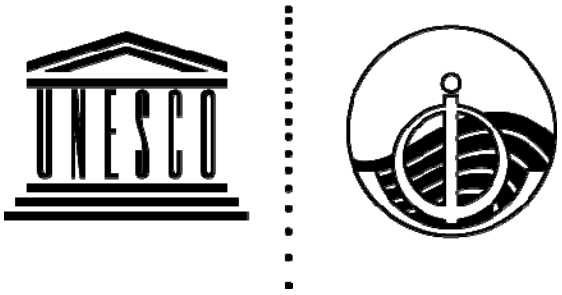

Indian Ocean Tsunami Warning and Mitigation System (IOTWS)

12 September 2007 Indian Ocean Tsunami Event

Post-Event Assessment of IOTWS Performance

UNESCO 2008

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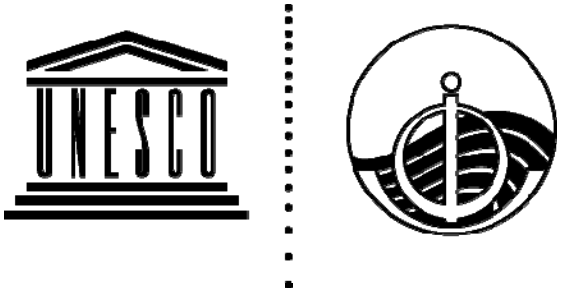

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Executive Summary

The 26 December 2004 tsunami killed over 230,000 people, displaced more than 1 million people and left a trail of destruction around the coasts of the Indian Ocean. Recognising the need for an early warning system, the coastal nations of the Indian Ocean responded quickly and gave the Intergovernmental Oceanographic Commission (IOC) of UNESCO the mandate to help all UNESCO member states of the Indian Ocean rim to establish their own Indian Ocean Tsunami Early Warning and Mitigation System (IOTWS). An Intergovernmental Coordination Group (ICG) for the IOTWS was formally established at the IOC Assembly in Paris, in June 2005.

The main objective of the IOTWS is to identify and mitigate the hazards posed by local and distant tsunamis. The goal is to create a fully integrated end-to-end warning system comprising three key components: hazard detection and forecasting; threat evaluation and alert dissemination; and community preparedness and response.

Since December 2004 there has been considerable progress in the installation of vital earthquake and tsunami detection equipment. An initial IOTWS providing limited tsunami warning capability for the Indian Ocean was declared operational in July 2006, the backbone of which at the regional level is the interim tsunami advisory service provided by the Pacific Tsunami Warning Centre (PTWC) in Hawaii and the Japanese Meteorological Agency (JMA) in Tokyo directly to the designated 24/7 National Tsunami Warning Centres (NTWC) of the IOTWS member states

The tsunami generated on the 12 September 2007 by a magnitude 8.4 earthquake southwest of Bengkulu, Sumatra occurred at a time when many components of the IOTWS had been installed and the interim tsunami advisory service had been operational for over 2 years. An Indian Ocean-wide watch bulletin was issued by PTWC and JMA for the first time since the interim advisory service began in March 2005. The event therefore presented an ideal opportunity to evaluate the performance of the IOTWS, to highlight both the strengths and weaknesses of the system, to identify areas that require further attention, and to provide a benchmark of the present status of the system

The UNESCO IOC Secretariat for the ICG/IOTWS sent out a post-event survey questionnaire to the 25 member states that have identified Tsunami Warning Focal Points (TWFP) and 21 responses were returned to the Secretariat in Perth. The objectives of the survey were to confirm that the NTWCs received bulletins from the interim advisory service in a timely manner, to determine what actions were taken by the NTWCs, and to find out if the member states activated their emergency response plans based on the available information.

The survey produced many positive results indicating that progress has been made in the development and implementation of the IOTWS. Some gaps and weaknesses were also identified, mainly at the downstream end of the system where national procedures for issuing tsunami warnings and evacuation orders require further attention in some member states.

The seismic and coastal and deep water sea level networks demonstrated that they were capable of detecting and locating the earthquake source and confirming that a tsunami had been generated. As these core networks expand, it is anticipated that the time and accuracy for both earthquake detection and tsunami confirmation will reduce further to within the targets set by the ICG.

It is beyond the scope of this report to conduct a detailed interpretation of the results, and the survey results have been presented so that individual member states and the ICG can draw conclusions from this exercise and decide on future action.

Although considerable progress has been made since 2004, it should be recognized that the IOTWS is not yet fully implemented and much remains to be done to bring the system to full operational status. The ICG will continue to monitor the system to ensure continuous improvement during the development phase.

CONTENTS

1. Introduction

1.1 Background

The 26 December 2004 tsunami killed over 230,000 people, displaced more than 1 million people and left a trail of destruction around the coasts of the Indian Ocean. Although the tsunami took over 2 hours to cross the Bay of Bengal, more than 50,000 in India, Sri Lanka, Maldives and East Africa lost their lives. An early warning system would have saved many thousands of lives, but none was in place at the time.

Recognising the need for an early warning system, the coastal nations of the Indian Ocean responded quickly. Following two intergovernmental meetings in Paris and Mauritius, the Intergovernmental Oceanographic Commission (IOC) of UNESCO was given the mandate to help all UNESCO member states of the Indian Ocean rim to establish their own Indian Ocean Tsunami Early Warning and Mitigation System (IOTWS), and an Intergovernmental Coordination Group (ICG) for the IOTWS was formally established at the IOC Assembly in Paris, in June 2005. ICGs for the NE Atlantic and Mediterranean (NEAMTWS) and the Caribbean (CARIBE-EWS) were formally established at the same time.

The main objective of the IOTWS is to identify and mitigate the hazards posed by local and distant tsunamis. The goal is to create a fully integrated end-to-end warning system comprising three key components: hazard detection and forecasting; threat evaluation and alert dissemination; and community preparedness and response. This end-to-end system concept is illustrated in Figure 1.1.

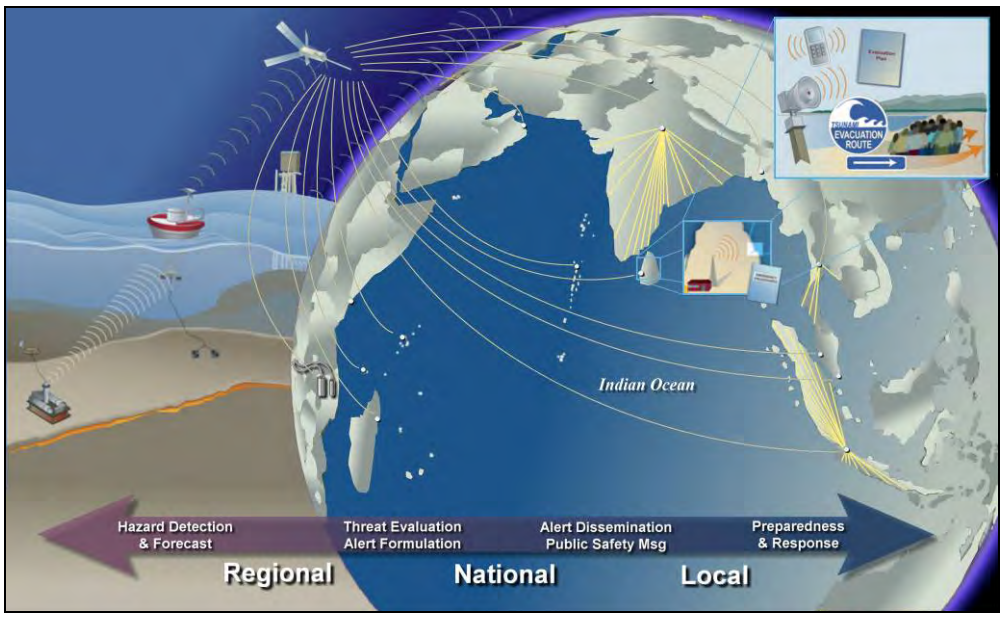


Figure 1.1 IOTWS end-to-end system concept. *Courtesy of USAID*

The IOTWS is owned by the member states of the Indian Ocean and requires a high degree of international and multilateral cooperation, under the governance of IOC. It can be thought of as a coordinated network of systems, designed according to well-defined operational standards which are uniformly implemented across the broad range of activities of the IOTWS.

An initial IOTWS was declared operational in July 2006, the backbone of which at the regional level is the interim tsunami advisory service provided by the Pacific Tsunami Warning Centre (PTWC) in Hawaii and the Japanese Meteorological Agency (JMA) in Tokyo directly to the 24/7 National Tsunami Warning Centres (NTWC) of the IOTWS member states. Eventually it is envisaged that this responsibility will be taken over by a number of Regional Tsunami Watch Providers (RTWP) located in the Indian Ocean region.

At the national level, each member state is responsible for issuing warnings to its own citizens through their NTWC. These warnings are based either on the NTWC's own analysis of the situation, on the advisory messages received from PTWC and JMA (and some other sources), or on a combination of both.

At the local level, coastal communities must be prepared to respond to warnings received through national dissemination channels and this is perhaps the greatest long term challenge facing the IOTWS.

1.2 Status of IOTWS as of 30 September 2007

Since December 2004 there has been considerable progress in the installation of vital earthquake and tsunami detection equipment. As of 30 September 2007, over 40 out of a projected total of 75 core seismic stations had been installed, with the remainder to be installed progressively up to 2010. Progress has also been made in the installation and upgrade of coastal sea level measurement gauges. By 30 September 2007, over 40 core network gauges were in operation, compared to 11 before the 2004 tsunami. Coastal sea level gauges have also been installed by some member states to provide data at a national level, but these are not currently available at the global level on the core network. Deep-ocean tsunami detection equipment has also been deployed. Malaysia, Indonesia and India have all deployed tsunameter systems in the Indian Ocean. Two US **D**eep-ocean **A**ssessment and **R**eporting of **T**sunamis (DART-II) tsunameter systems have been installed: one in the middle of the Bay of Bengal (deployed in December 2006, in association with Thailand) and the other about 1,150km to the west of Sumatra (deployed in late September 2007, in association with Indonesia, but not in place on 12 September). By the end of September 2007 there were 9 tsunameters deployed in the Indian Ocean and there are plans to deploy a further 23 across the Indian Ocean by the end of 2008.

Most countries in the region (26 out of 28) have established NTWCs with communications links to the interim service providers, PTWC and JMA. In many cases (22 out of 28) the NTWCs are situated in or have links with the National Meteorological Centres (NMC) and therefore have access to the World Meteorological Organisation's (WMO) Global Telecommunications System (GTS). Both PTWC and JMA conduct regular communications tests with the member states' NTWCs using the GTS, fax and email.

It is more difficult to assess the progress that has been made at the local community level because it is not easy to quantify community awareness and preparedness. Many countries have implemented community awareness programmes and have conducted evacuation drills. It is certainly recognised that this part of the system will take longer to implement than the detection and warning components of the IOTWS. It is also widely recognised that detection and warning will be useless unless communities know how to respond, and much effort is being focused on these activities at present.

1.3 12 September 2007 Sumatra Tsunami – an Opportunity to Assess Performance

The tsunami generated on the 12 September 2007 by a magnitude 8.4 earthquake 130km southwest of Bengkulu, Sumatra occurred at a time when many components of the IOTWS had been installed and the interim tsunami advisory service had been operational for over 2 years. An Indian Ocean-wide watch bulletin was issued by PTWC and JMA for the first time since the interim advisory service began in March 2005. The event therefore presented an ideal opportunity to evaluate the performance of the IOTWS, to highlight both the strengths and weaknesses of the system, to identify areas that require further attention, and to provide a benchmark of the present status of the system

A post-event survey questionnaire was sent out to the 25 member states that have identified Tsunami Warning Focal Points (TWFP) and 21 responses were returned to the ICG/IOTWS Secretariat in Perth, which made follow up calls to clarify and confirm some of the responses. The objectives of the survey were to confirm that the NTWCs received bulletins from the interim advisory service in a timely manner, to determine what actions were taken by the NTWCs, and to find out if the member states activated their emergency response plans.

This report is intended to be unbiased and constructive, and not to be in any way critical or judgemental. The intention is to provide an open and honest assessment of the performance of the IOTWS on the 12th September 2007 and we are grateful to the Indian Ocean member states who responded in this spirit to the survey questionnaire.

2. Event Characteristics

2.1 Earthquake Facts

At 11:10:26 UTC on 12 September 2007, an earthquake of magnitude 8.4 occurred 130 km SW of Bengkulu, Sumatra, Indonesia (Figure 2.1). The earthquake parameters were as follows (from USGS):

Location: 4.517°S., 101.382°E.
Depth: 30 km
Magnitude (Mw): 8.4

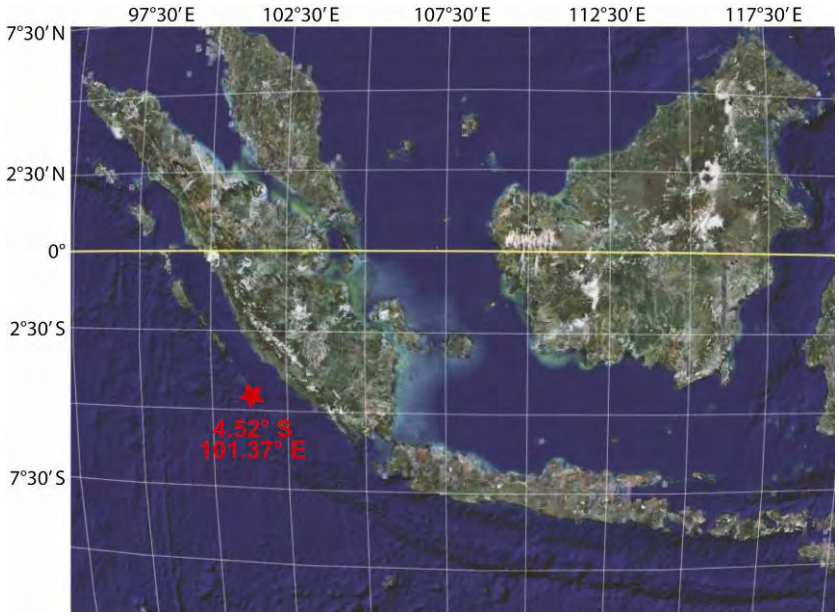


Figure 2.1 Location map of the 12 September 2007 earthquake, 130 km SW of Bengkulu, Sumatra, Indonesia. *Background map from Google Earth*. Image NASA. Image © 2008 TerraMetrics

The earthquake occurred as a result of thrust faulting on the boundary of the Australian and Sunda plates. The Australian plate is currently moving NNE at a rate of about 6 cm per year and this movement is accommodated by thrust faulting which results in earthquakes. Large earthquakes occur relatively frequently in this region, with four earthquakes greater than magnitude 7.9 occurring in the past decade (USGS).

Significant aftershocks occurred for several weeks following the initial earthquake event. A second earthquake measuring 7.9 magnitude occurred just over twelve hours after the 8.4 event, about 300 km to the north, and is considered by the USGS to be a separate event rather than an aftershock of the 8.4 magnitude event (Figure 2.2). Tsunami warnings were also issued for this event and for several of the aftershocks in the days following the initial earthquake, but only the 8.4 event will be discussed in this report.

The amount of fault slip caused by an earthquake is determined from the inversion of teleseismic body waveforms, called a finite fault model. The amount of slip at the surface relates directly to the size of tsunami wave generated by the earthquake event. The finite fault model for the 12 September event (Figure 2.3) shows that there was a maximum slip of about 4.0 m at 30 km depth, but slip at the surface was less than 0.5m (USGS).

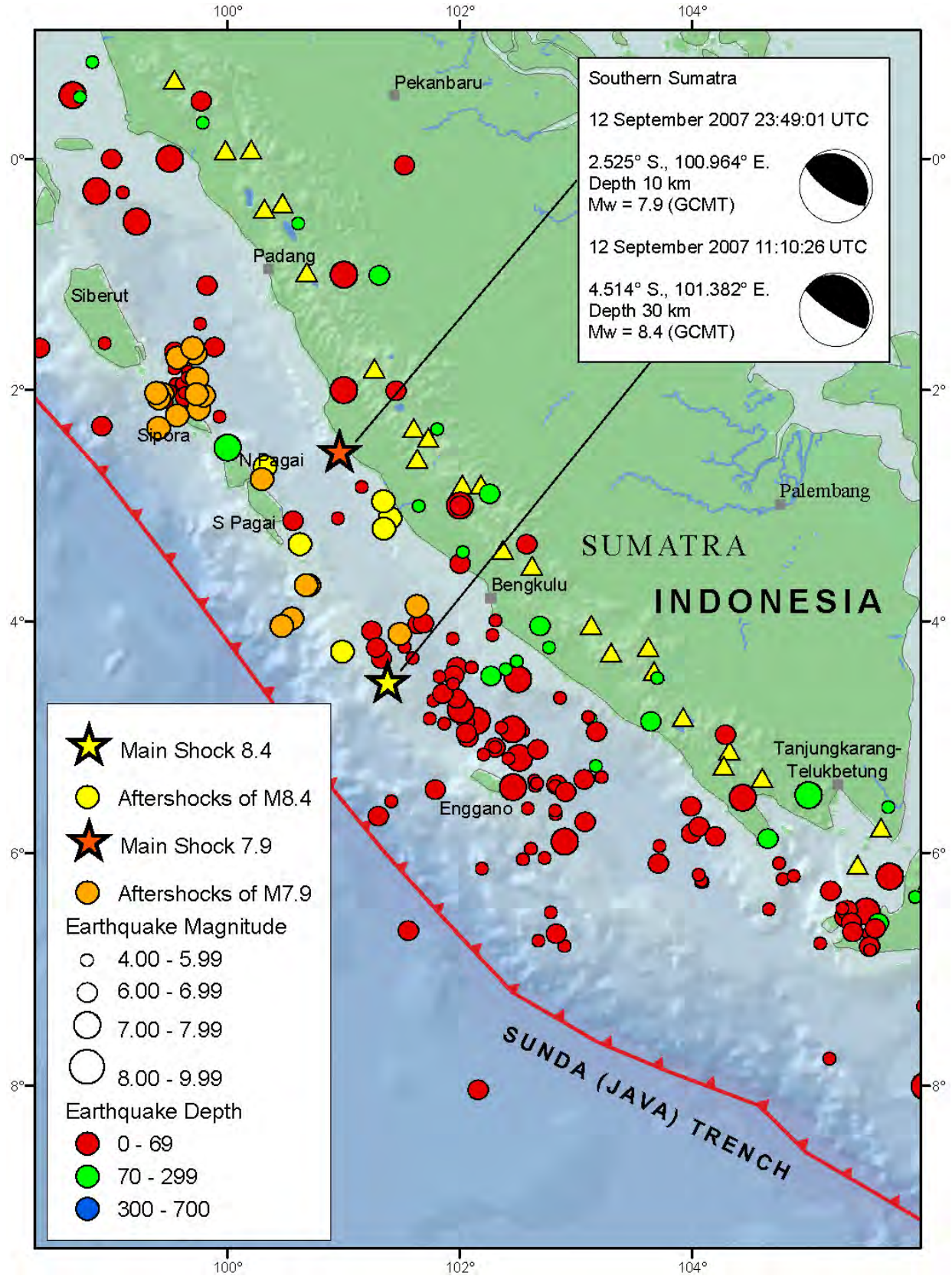


Figure 2.2 Location map of the 12 September magnitude 8.4 event and also the 7.9 event. *Courtesy of USGS.*

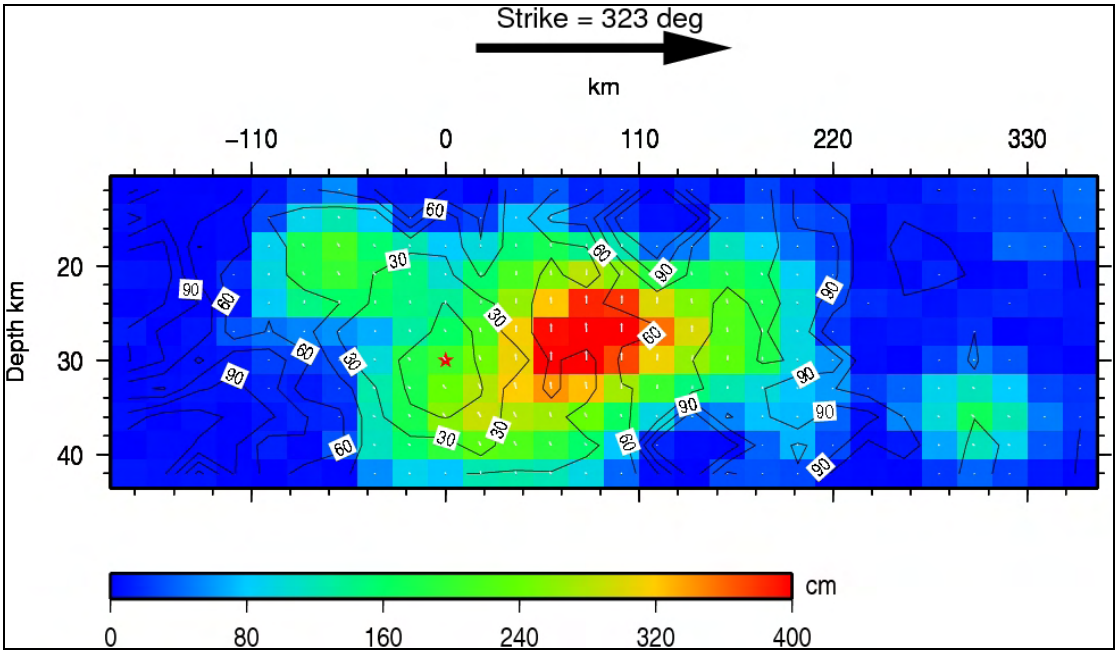


Figure 2.3 Finite Fault model of the 12 September magnitude 8.4 earthquake, showing slip distribution across the fault plane. The model shows that maximum slip of about 4 m occurred at about 30 km depth, but slip at the surface was less than 50 cm. *Courtesy of USGS.*

2.2 Tsunami Modelling and Sea Level Observations

2.2.1 Tsunami Modelling

The use of numerical modelling to predict tsunami wave heights is gradually increasing. Several models have been developed and utilized to forecast tsunami wave heights and inundation limits. Various trainings have been organized by UNESCO IOC for Indian Ocean countries, to build capacity in this area.

The Method of Splitting Tsunami (MOST) model developed by the Pacific Marine Environmental Laboratory (PMEL) of NOAA was used during the 12th September event to predict wave heights for the Indian Ocean (Figure 2.4). In addition to the MOST model, NOAA/PMEL used an interface which housed pre-run scenarios from different seismic sources. This database helped to save considerable computing time when running the simulations in real-time, allowing rapid publication of model results.

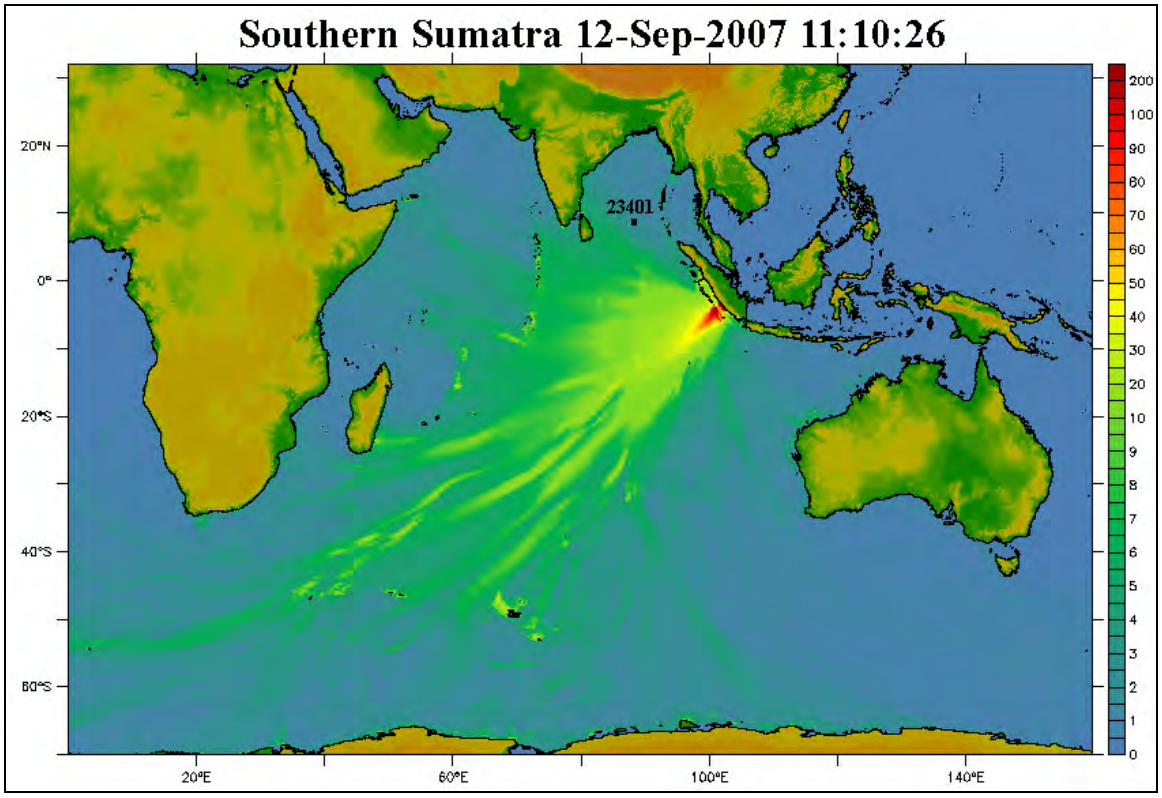


Figure 2.4 Wave heights(mm) forecasts for 12th September event using MOST model. *Courtesy of Vasily Titov (NOAA/PMEL)*

2.2.2 Travel Time Modelling

Another model package that has proved to be useful for predicting tsunami propagation is the Tsunami Travel Time (TTT) software developed by Paul Wessel, GeowareTravel and distributed by World Data Center (WDC) for Solid Earth Geophysics, located at the NOAA National Geophysical Data Center (NGDC) in Boulder, Colorado, USA in cooperation with the International Tsunami Information Center (ITIC) and UNESCO IOC.

The output of the travel times using latitude 4.5^{O} South and longitude 103.1^{O}E (PTWC and JMA bulletins, 12th September 2007) as origin is shown in Figure 2.5. The model used bathymetry data from the ETOPO2 database at 5 minutes resolution. The precision of the model is dependent on the bathymetric resolution. However, a comparison between the observed and the simulated arrival times (Table 2.1) showed very high correspondence and consequently demonstrated the robustness of the model, except at Padang where the large discrepancy between modelled and observed time of arrival may be due to near-field errors introduced by modelling the earthquake as a point rather than a linear source.

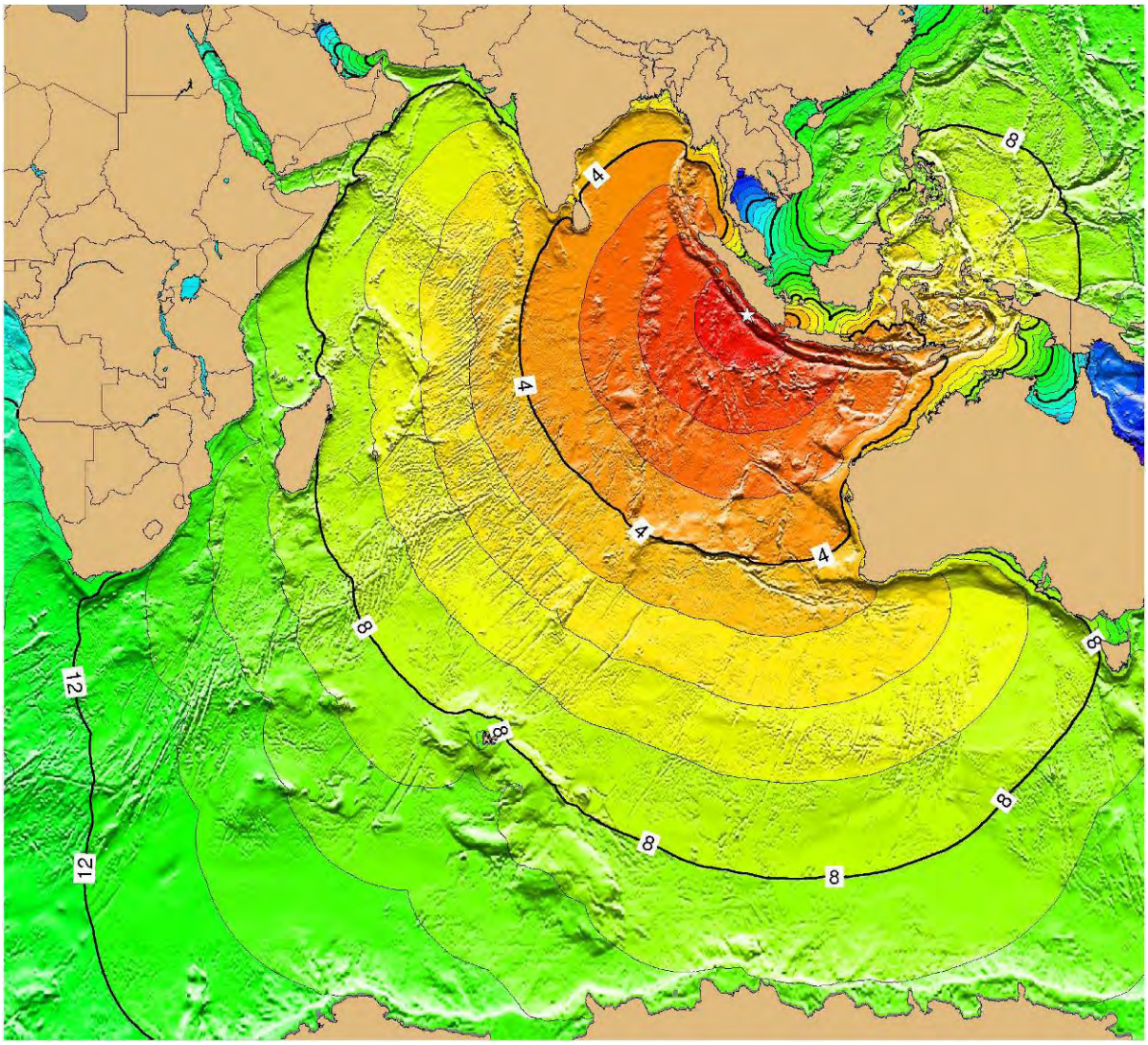


Figure 2.5 Travel time in hours from source on 12th September 2007, using Tsunami Travel Time model**.**

2.2.3 Sea Level Observations

The Indian Ocean sea level station network proved to be effective for monitoring the 12th September tsunami event. Sea level data measured by the core IOTWS network is available over the Global Telecommunications System (GTS) and can be monitored using tools such as TideTool (developed by PTWC) and ODINAFRICA (the African Sea level Data facility, developed by GLOSS within the framework of the IODE/ODINAFRICA project) as shown on Figure 2.6. Such tools demonstrate the value of near real-time networks for monitoring sea level across the Indian Ocean basin but are dependent on data sharing and data delivery performance, which the ICG is continually striving to improve.

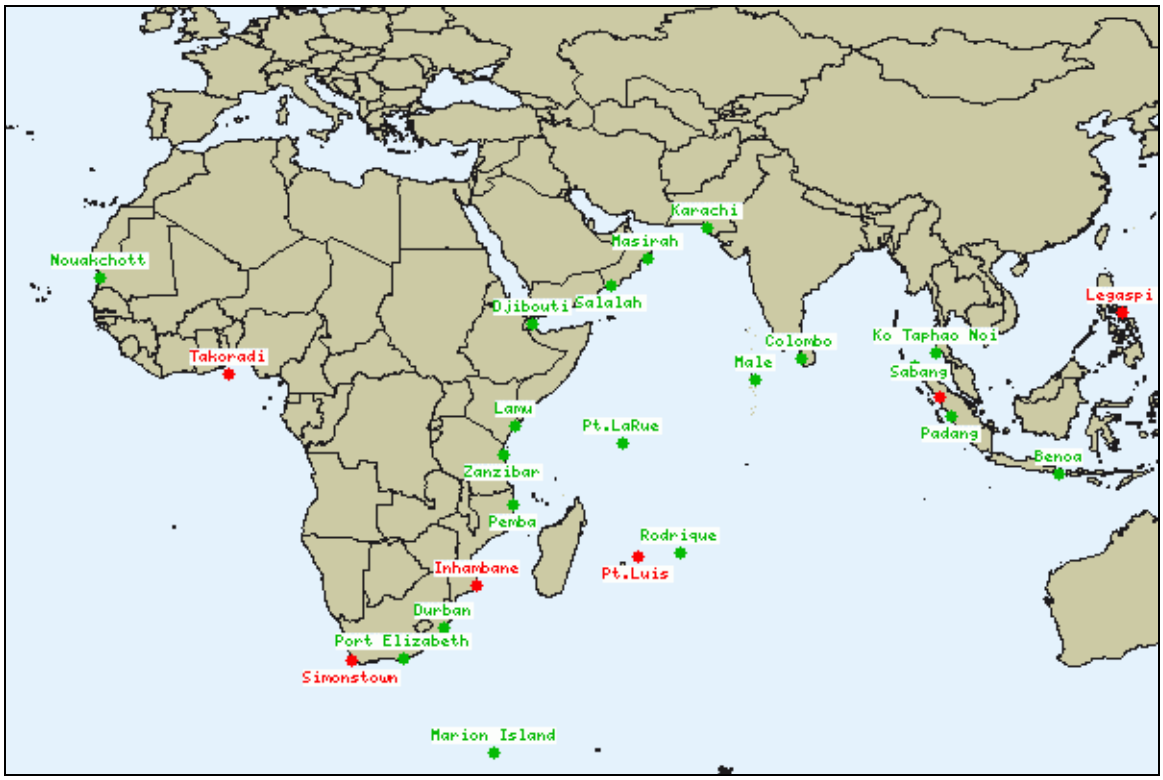


Figure 2.6 Sea Level Gauge Stations, Indian Ocean, as at 12 September 2007 (ODINAFRICA)

Data from eight sea level gauges are shown on time series Figures 2.8 to 2.15 to illustrate the passage of the tsunami wave across the Indian Ocean, namely Padang, Cocos, Colombo, Male, Rodrigues, Salalah, Lamu and Port Elizabeth. Each figure is for the 24 hour period 0600hrs 12 September to 0600hrs 13 September (UTC) and both the earthquake time (11:10 UTC) and arrival time of the first wave are shown. Figure 2.7 shows sea level time series superimposed on the Indian Ocean tsunami travel time isochrones for this event and demonstrates close correlation between predicted and observed tsunami arrival time.

Padang, Sumatra, Indonesia (Figure 2.8)

Padang sea level station is located closest to the epicentre and was operational at the time of the event. The first tsunami wave was recorded at around 11:54, 44 minutes after the earthquake and was a leading depression wave, i.e. sea level initially receded. The largest (and highest) waves were numbers 3 and 4 in the train, reaching approximately 2.2m trough to peak, and fluctuations in sea level continued for more than 24 hours after the initial event. This was probably caused by wave reflection between the outer island arc and the mainland and may have been compounded by a second strong earthquake some 12 hours after the initial event. (The gaps in the real time data time series are understood to be have been caused by failure in the satellite communication system.

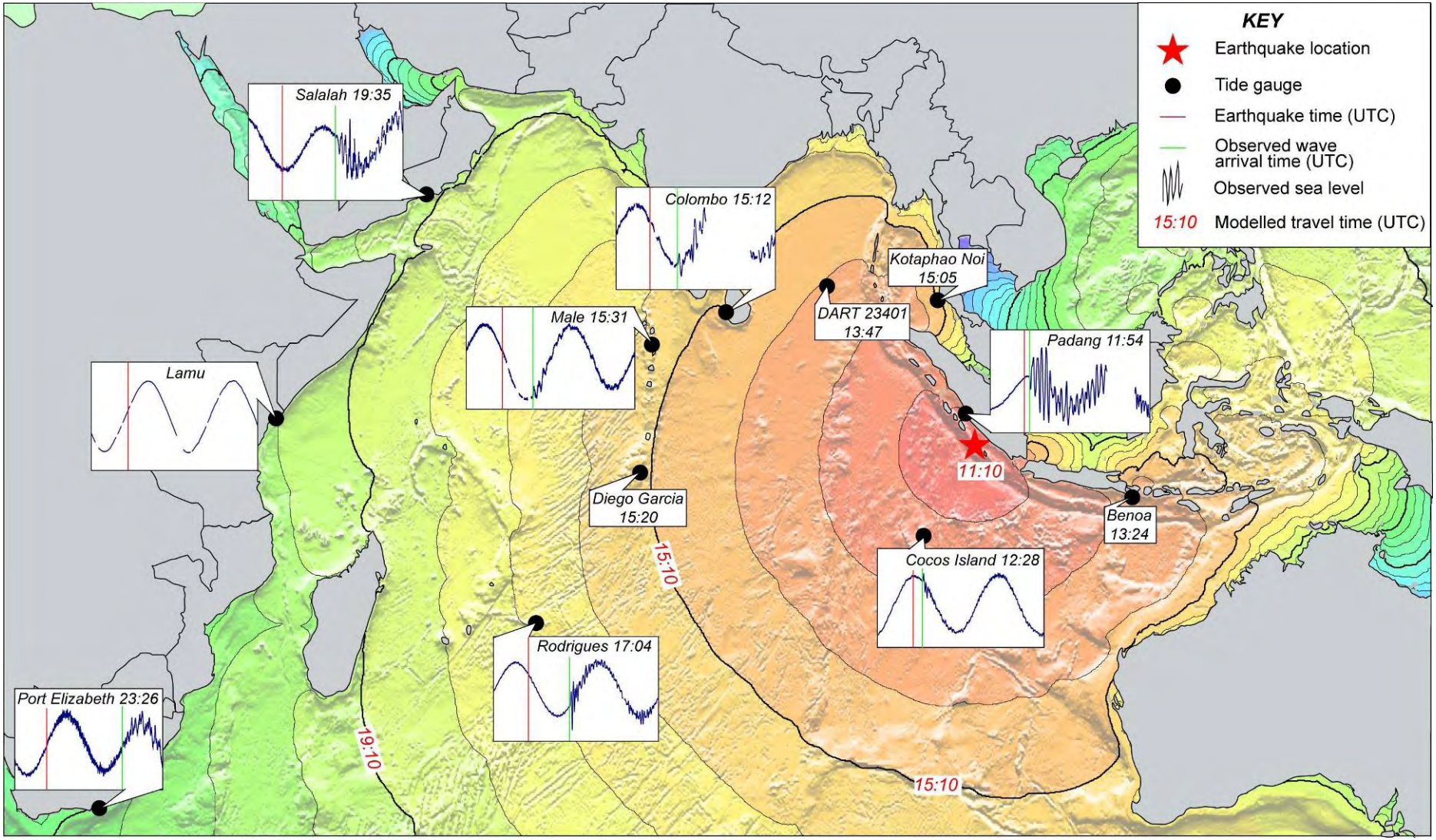


Figure 2.7 Tsunami travel time isochrones and sea level time series for the 12 September 2007 tsunami event.

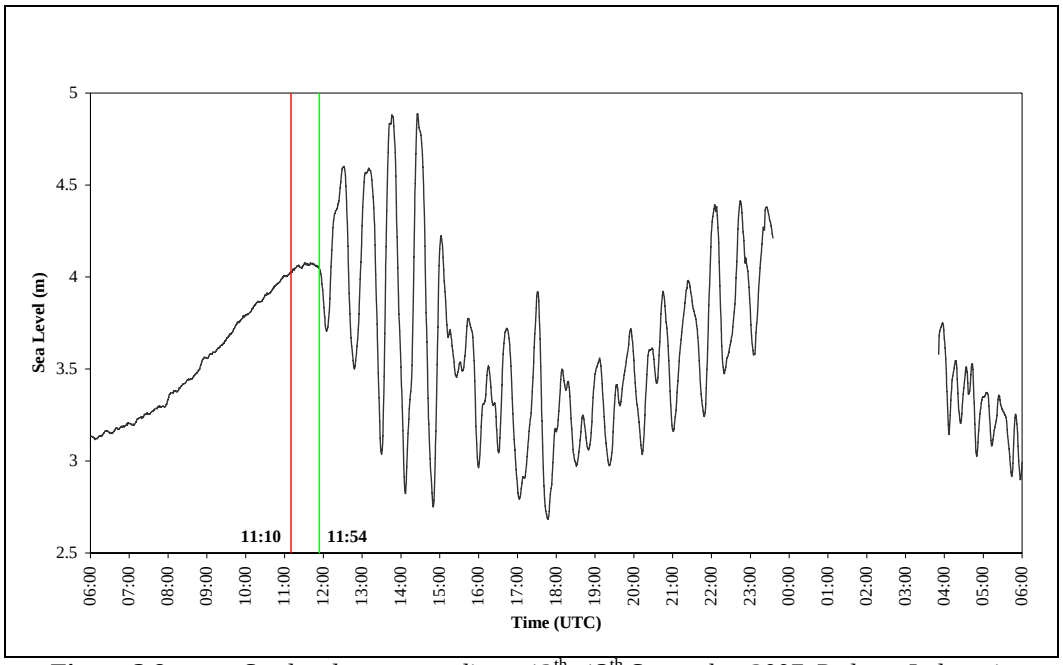


Figure 2.8 Sea level gauge readings, 12th -13th September 2007, Padang, Indonesia

Cocos Island, Australia (Figure 2.9)

The first tsunami wave reached the Cocos sea level gauge at 12:28, about 1hr 20mins after the earthquake event but, unlike the Padang first arrival, was a leading elevation wave, i.e. the wave crest arrived first. This was the case for all measurement sites on the western side of the generation site and is a function of the fault geometry and rupture dynamics. The height of the first wave was 0.24m trough to peak and there were 3 distinct wave arrivals followed by low level wave activity (waves <0.1m) which continued for 6 – 12 hours after the first arrival.

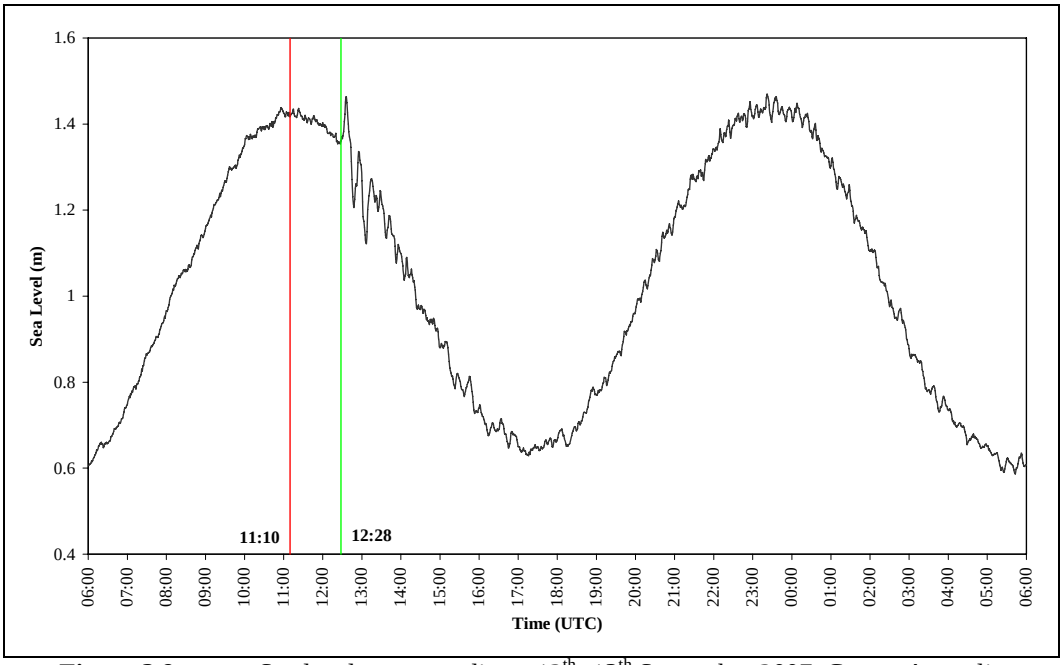


Figure 2.9 Sea level gauge readings, 12th -13th September 2007, Cocos, Australia

Colombo, Sri Lanka (Figure 2.10)

The first tsunami wave reached the Colombo sea level gauge at 15:12, about 4 hours after the earthquake. The wave height of the first arrival was about 0.26m, and higher wave activity was measured approximately 2 – 3 hours after the first wave. This could be the result of wave reflection from the Maldives ridge. (The extensive data dropout in the time series is understood to be due to failure in data communications.

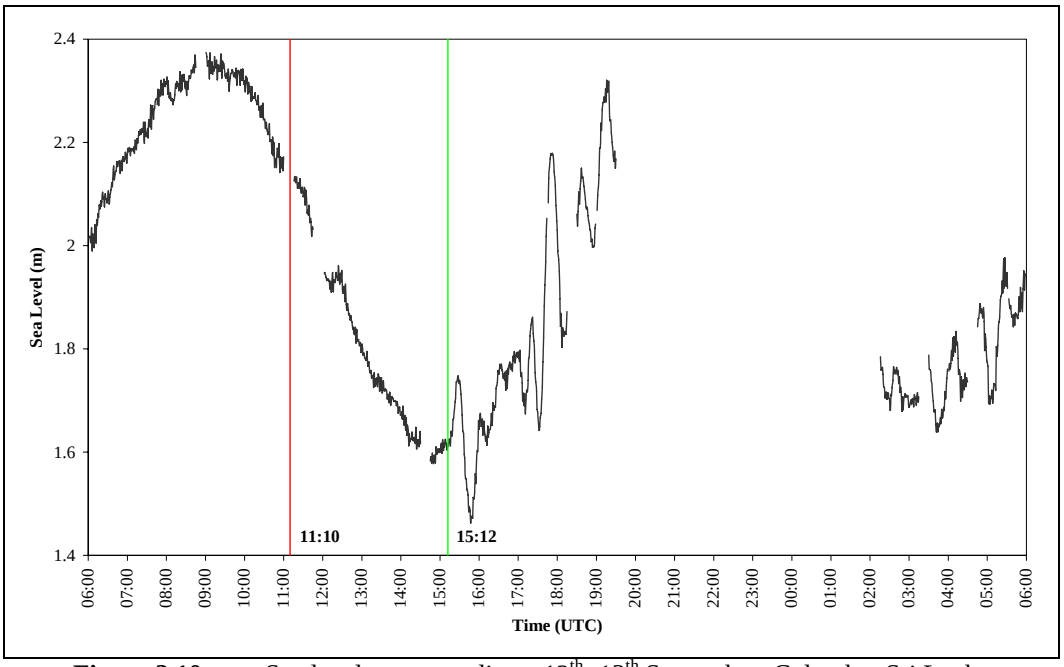


Figure 2.10 Sea level gauge readings, 12th -13th September, Colombo, Sri Lanka

Male, Maldives (Figure 2.11)

The first tsunami wave arrived at the Male sea level gauge at 15:31, approximately 4hr 20mins after the earthquake and was a leading elevation wave with a height of approximately 0.125m. Low tsunami wave activity can be seen to continue for a further 12 hours after the initial wave arrival,

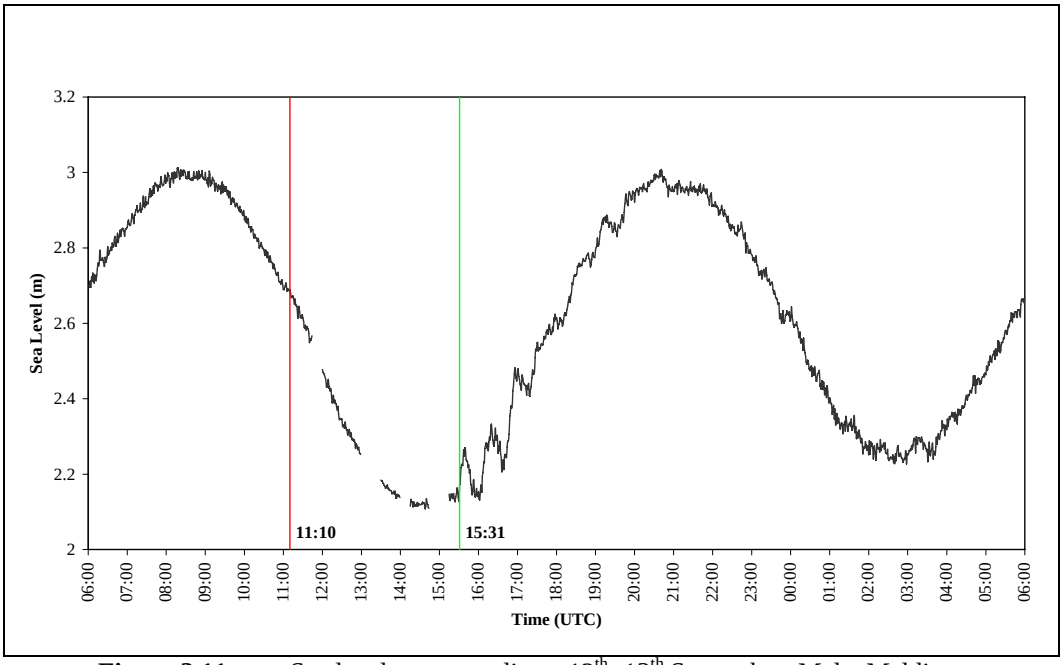


Figure 2.11 Sea level gauge readings, 12th -13th September, Male, Maldives

Rodrigues, Mauritius (Figure 2.12)

The first tsunami wave arrived at Rodrigues at 17:04, nearly 6 hours after the earthquake and was a leading elevation wave with an initial height of approximately 0.94m. Considerable wave activity can be seen to continue for at least 12 hours after the initial event. The height of the initial wave and the continued activity suggest that harbour resonance or seiching may have taken place at this location. Numerical model results (see Section 2.2.1) also indicate that the main focus of wave energy from the tsunami generation zone was in the direction of Rodrigues.

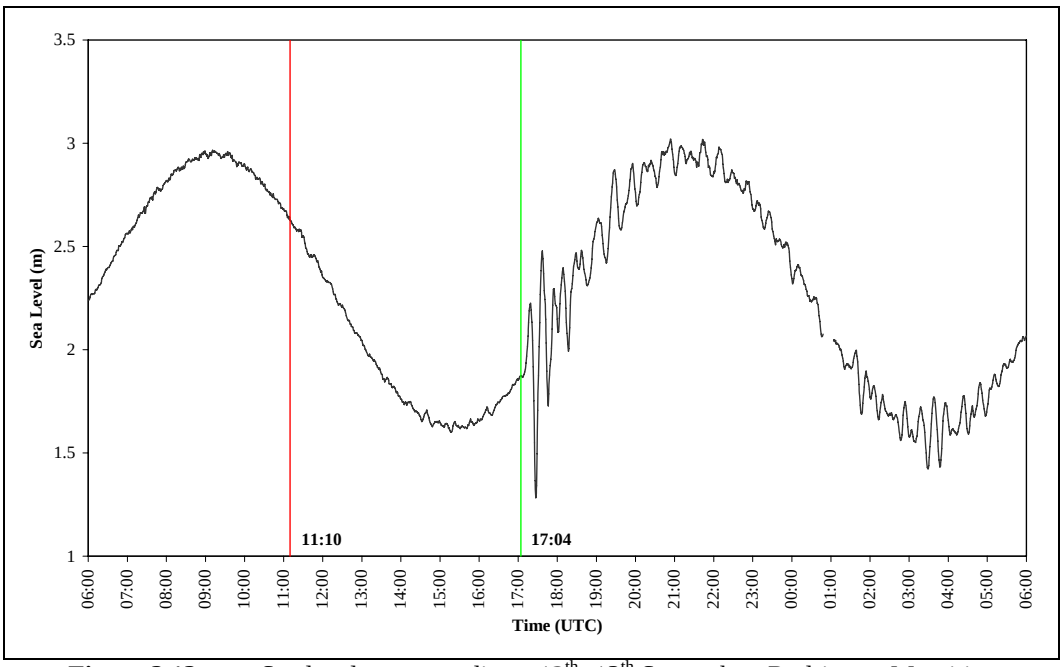


Figure 2.12 Sea level gauge readings, 12th -13th September, Rodrigues, Mauritius

Salalah, Oman (Figure 2.13)

The first wave arrival was at approximately 19:35, or 8hrs 25mins after the earthquake. Although not clear on the time series, the first wave is in fact a leading elevation as expected, but with very small amplitude. The resulting wave activity both in terms of height and duration, suggest that there is either considerable harbour resonance or possibly basin seiching at this location, as the site is remote from the generation zone and not in the main focus of wave energy. Similar high wave activity was also experienced during the 26 December 2004 tsunami.

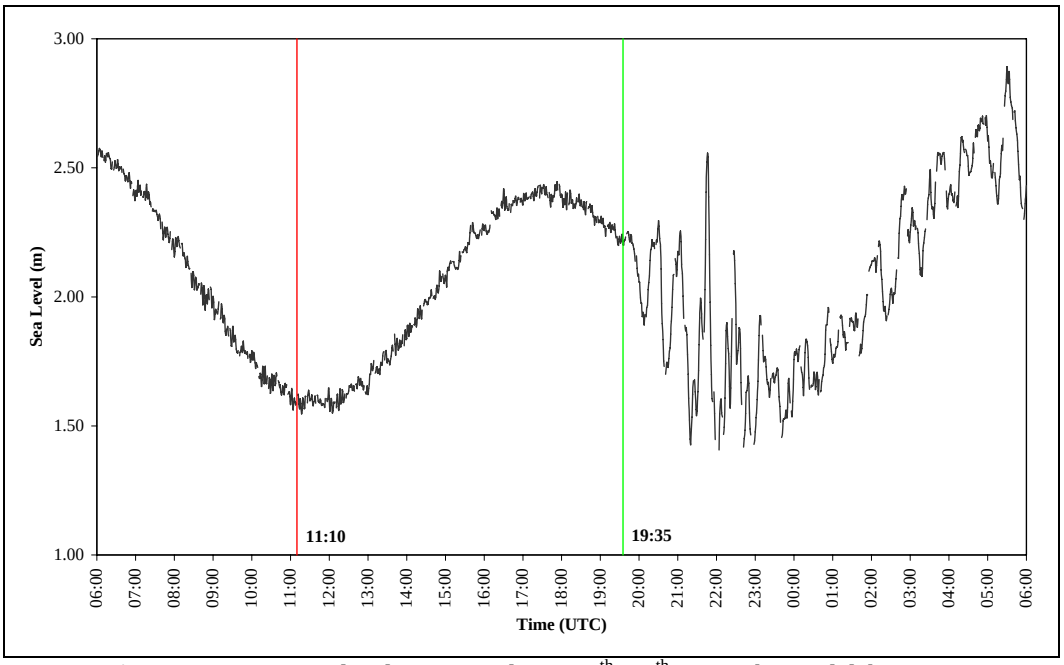


Figure 2.13 Sea level gauge readings, 12th -13th September, Salalah, Oman

Lamu, Kenya (Figure 2.14)

There is little evidence of significant tsunami activity at this location, although there appear to have been small perturbations in sea level 9 – 11 hours after the earthquake.

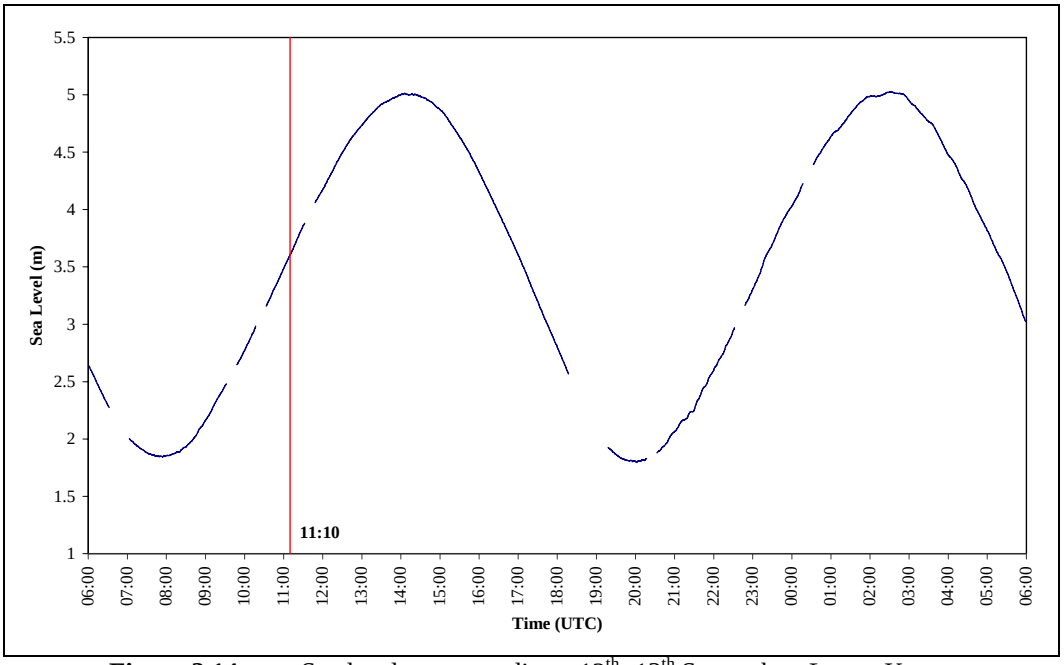


Figure 2.14 Sea level gauge readings, 12th -13th September, Lamu, Kenya

Port Elizabeth, South Africa (Figure 2.15)

Although the sea level data at this site contains a lot of high frequency noise, tsunami activity can be clearly seen starting at about 23:30, or 12hrs 20mins after the earthquake.

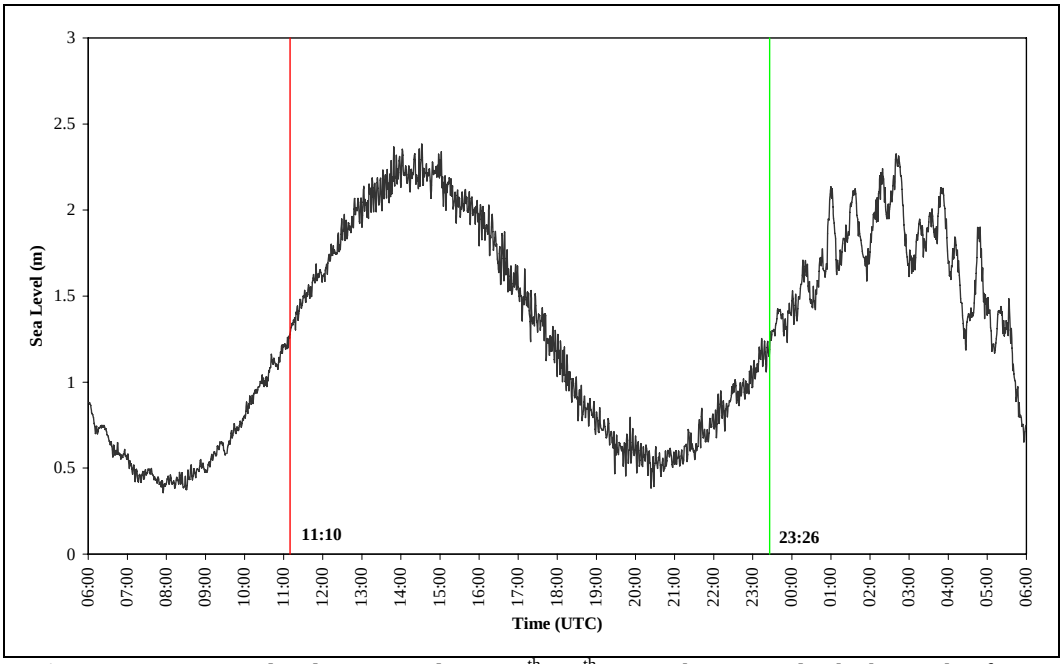


Figure 2.15 Sea level gauge readings, 12th -13th September, Port Elizabeth, South Africa

Deep Ocean Tsunameter Data

The Indian Ocean is presently being equipped with deep ocean sea level stations, also known as "tsunameters". On the 12 September 2007, only US-Thai DART buoy number 23401 deployed at approximately 9^{O} North, 89^{O} East was operating in real-time. The DART buoy was triggered into recording mode by the seismic wave from the earthquake and recorded the passage of a tsunami of 0.046m wave height at 13:47, 2hrs 37mins after the earthquake.

Summary of Wave heights

Table 2.1 summarises the maximum observed wave heights recorded at selected sea level gauges around the Indian Ocean, together with observed and modelled arrival times.

Sea level stations	Maximum Wave Height (trough to peak, m)	Observed Arrival Time (UTC)	Modelled Arrival Time
Padang, Indonesia	2.27	11:54	12:28*
Cocos Island, Australia	0.24	12:28	12:30
DART 23401	0.05	13:47	14:02
Colombo, Sri Lanka	0.25	15:12	15:15
Diego Garcia	0.09	15:20	15:24
Kotaphao Noi, Thailand	0.09	15:05	15:21
Rodrigues, Mauritius	1.14	17:04	17:06
Pt La Rue, Seychelles	0.40	19:06	18:52
Salalah, Oman	1.31	19:35	19:26

** See Section 2.2.2 for discussion of this discrepancy*

Table 2.1 Maximum wave heights at selected sea level stations, 12th September, 2007.
Wave heights and observed arrival times courtesy of Stuart Weinstein, Pacific Tsunami Warning Centre, with the exception of the observed arrival time at Salalah, Oman. Modelled Arrival Time calculated using the Tsunami Travel Time (TTT) model.

2.3 PTWC and JMA Bulletins

Following the earthquake, PTWC and JMA issued bulletins at the following times (In chronological order UTC). Note that JMA bulletins show the observed first arrival of the tsunami at each location, whereas PTWC bulletins show the time of observed maximum tsunami amplitude. Full bulletins are provided in Annex 1.

1110 Earthquake occurs

1124 **PTWC Bulletin #1** – Mwp=7.9: Indian Ocean-wide tsunami watch

1136 **JMA Bulletin #1** – Mwp=7.9: Indian Ocean-wide tsunami watch

1153 **PTWC Bulletin #2** – upgraded Mwp=8.2: Indian Ocean-wide tsunami watch

1208 **JMA Bulletin #2** – upgraded Mwp=8.2: Indian Ocean-wide tsunami watch

1230 **PTWC Bulletin #3** – 0.35m at Padang (1221)

1251 **JMA Bulletin #3** – 0.5m at Padang (1155)

1321 **PTWC Bulletin #4** – 0.56m at Padang (1306), 0.11m at Cocos Island (1236)

1335 **JMA Bulletin #4** – 0.6m at Padang (1155), 0.1m at Cocos (1228)

1425 **JMA Bulletin #5** – 1.0m at Padang (1155), 0.1m at Cocos (1228)

1440 **PTWC Bulletin #5** – 0.98m at Padang (1348), 0.11m at Cocos (1236), 0.02m DART 23401 (1421)

1505 **PTWC Bulletin #5** – FINAL BULLETIN. 0.09m at Sibolga (1434), 0.98m at Padang (1348), 0.11m at Cocos (1236), 0.02m DART 23401 (1421)

1726 **JMA Bulletin #6** – 0.1m at Cocos (1228), 0.4m at Hanimaadhoo (1557), 1.1m at Padang (1155)

2110 **JMA Bulletin #7** – 0.1m at Cocos (1228), 0.4m at Hanimaadhoo (1557), 1.1m at Padang (1155), 0.6m at Port La Rue (1821), 0.6m at Rodrigues (1713)

3. Survey Questionnaire

The ICG/IOTWS designed a questionnaire to obtain information from the member states covering 4 main areas of interest:

- ***Interim Advisory Service***
  The purpose of the questions in this section was to establish if and when the NTWCs had received the first and subsequent tsunami watch bulletins from PTWC and JMA, and if they had also received bulletins from other sources.

- ***National Actions***
  In this section the purpose of the questions was to find out what actions were taken by the NTWCs, including independent analysis of the event, notification of relevant organisations, issuing and cancellation of warnings.

- ***National Response***
  The purpose of the questions in this section was to find out what the national and local response was to the event after the tsunami warning had been issued by the NTWC, in particular if there were any evacuations.

- ***Monitoring and Modelling***
  The last section of the questionnaire was intended to ascertain which member states used numerical model scenarios and real time sea level data in their decision making.

The questionnaire is included in Annex 2 together with the covering letter sent out to member states.

Currently the ICG/IOTWS comprises 28 member states. However the Secretariat does not have Tsunami Warning Focal Points (TWFP) or Tsunami National Contacts (TNC) for Djibouti, Somalia or United Arab Emirates, so it was not possible to include these countries in the survey. Out of the 25 member states, 21 responded, with only Comoros, Myanmar, United Kingdom and Yemen failing to respond.

Member states were also encouraged to include additional information and comments and many of them took the opportunity to provide the Secretariat with national reports of the event and constructive suggestions for future surveys.

4. Country Reports

The following sections provide details of the response of individual countries, based on information provided in the questionnaires. Note that questionnaires were not returned by Comoros, Myanmar, Somalia or Yemen.

The country reports are given in the form of a response timeline followed by a commentary based on information provided by the participating countries. Figure 4.1 shows the timeline legend.

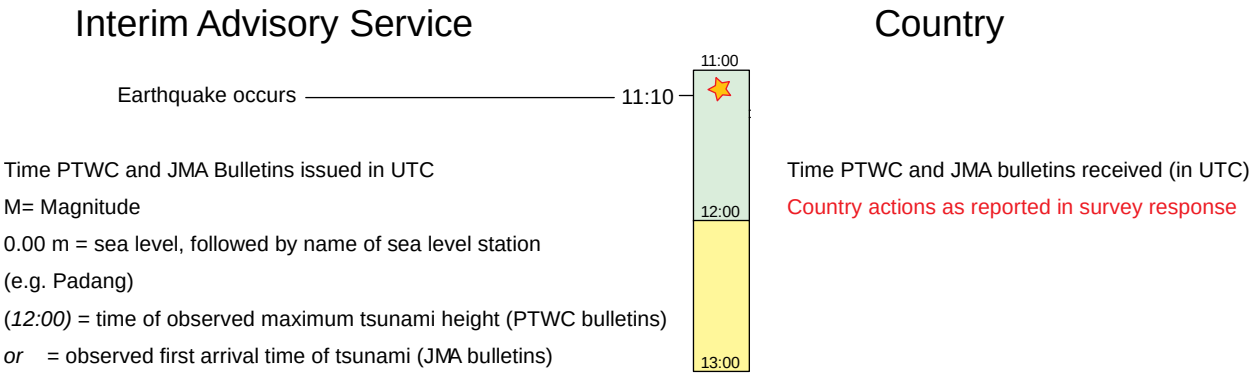
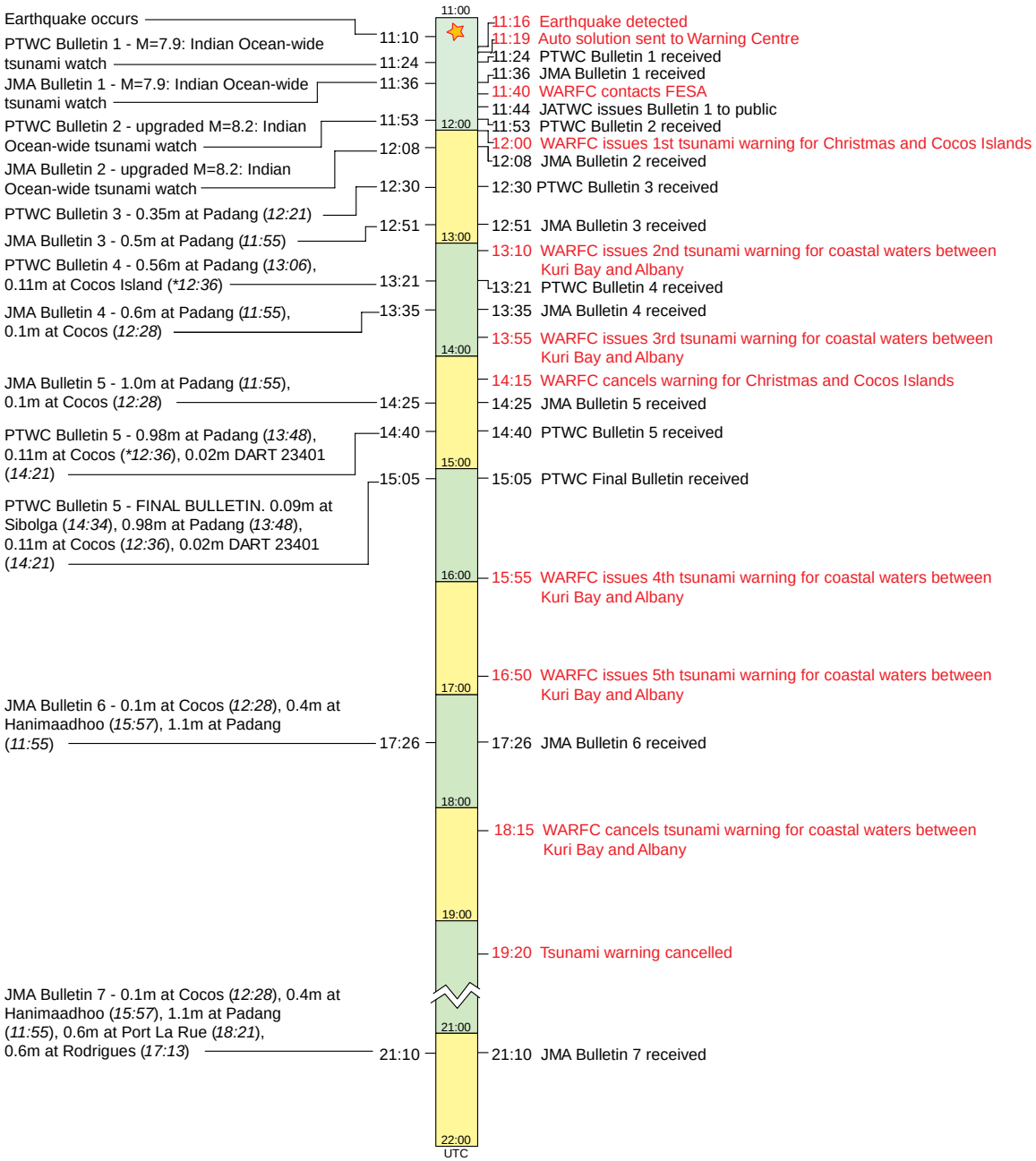


Figure 4.1 Interim advisory service and country response timeline legend

The left side of the timelines lists the times at which bulletins were issued by the Interim Advisory Service (JMA and PTWC) and is the same for each timeline. Also shown on the left side is sea level information (sea level, gauge location and time of observation) issued in the JMA and PTWC bulletins. The information on the right side is provided by individual countries and lists the times at which the various bulletins were received from the Interim Advisory Service and the times at which country actions were taken, highlighted in red.

Note that all times in this report are in Coordinated Universal Time (UTC).

4.1 AUSTRALIA



Country Commentary

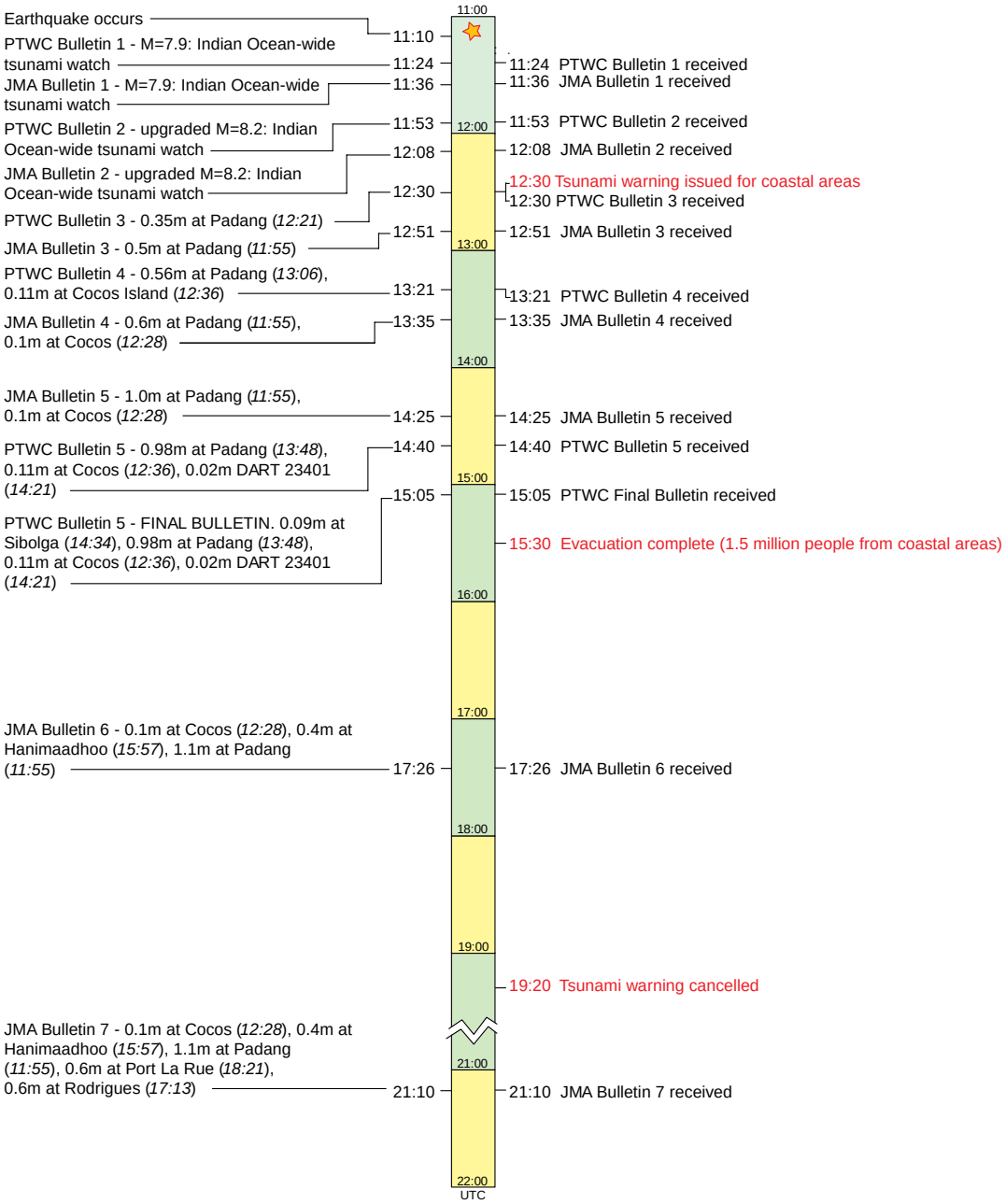
- Tsunami bulletins from the JMA and PTWC were received within 1 minute of them being issued.

- Effects of the tsunami on Western Australia and the Australian offshore territories of Cocos and Christmas Islands were minor and sea level fluctuations were in the order of 0.1m.

- Delays at Geoscience Australia in providing a confirmed manual seismic solution which could be used as the basis for a JATWC bulletin. Initial magnitude calculations were too low and there was an error in epicentre location. Bulletin was issued 33 minutes after the quake, which is 3 minutes outside the target response time of 30 minutes.

- The warning for Cocos and Christmas Islands was cancelled at 14:15, just over three hours after the event, and the warning for the Western Australian mainland was cancelled at 18:15, about seven hours after the event.

4.2 BANGLADESH



Country Commentary

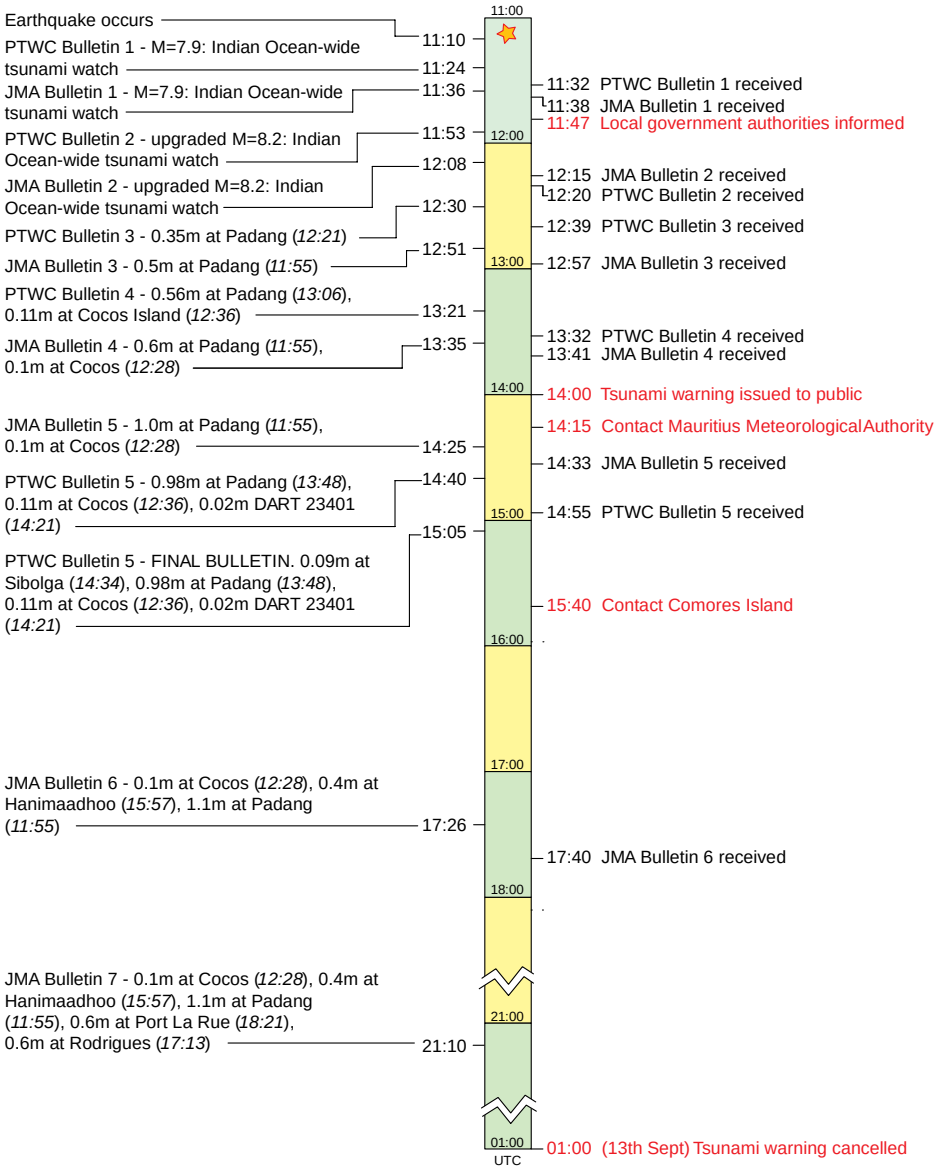
- Tsunami bulletins from the JMA and PTWC were received within 1 minute of being issued.

- A tsunami warning was issued for coastal areas at 12:30, 1 hour 20 minutes after the earthquake. The warning was issued by phone, fax and email to government and disaster agencies, and was passed on to coastal people using phone, fax, email and sirens.

- About 1.5 million people were evacuated from coastal areas, utilising procedures developed for the Cyclone Preparedness Programme. The evacuation was completed within 3 hours of warning dissemination, and no problems were encountered with the evacuation process.

- The tsunami warning was cancelled at 19:20 after no tsunami wave was observed. Sea level data were not monitored during the event, and the BMD indicated it did not know how to access sea level data over the GTS or through ODINAFRICA

4.3 FRANCE (La Reunion)



Country Commentary

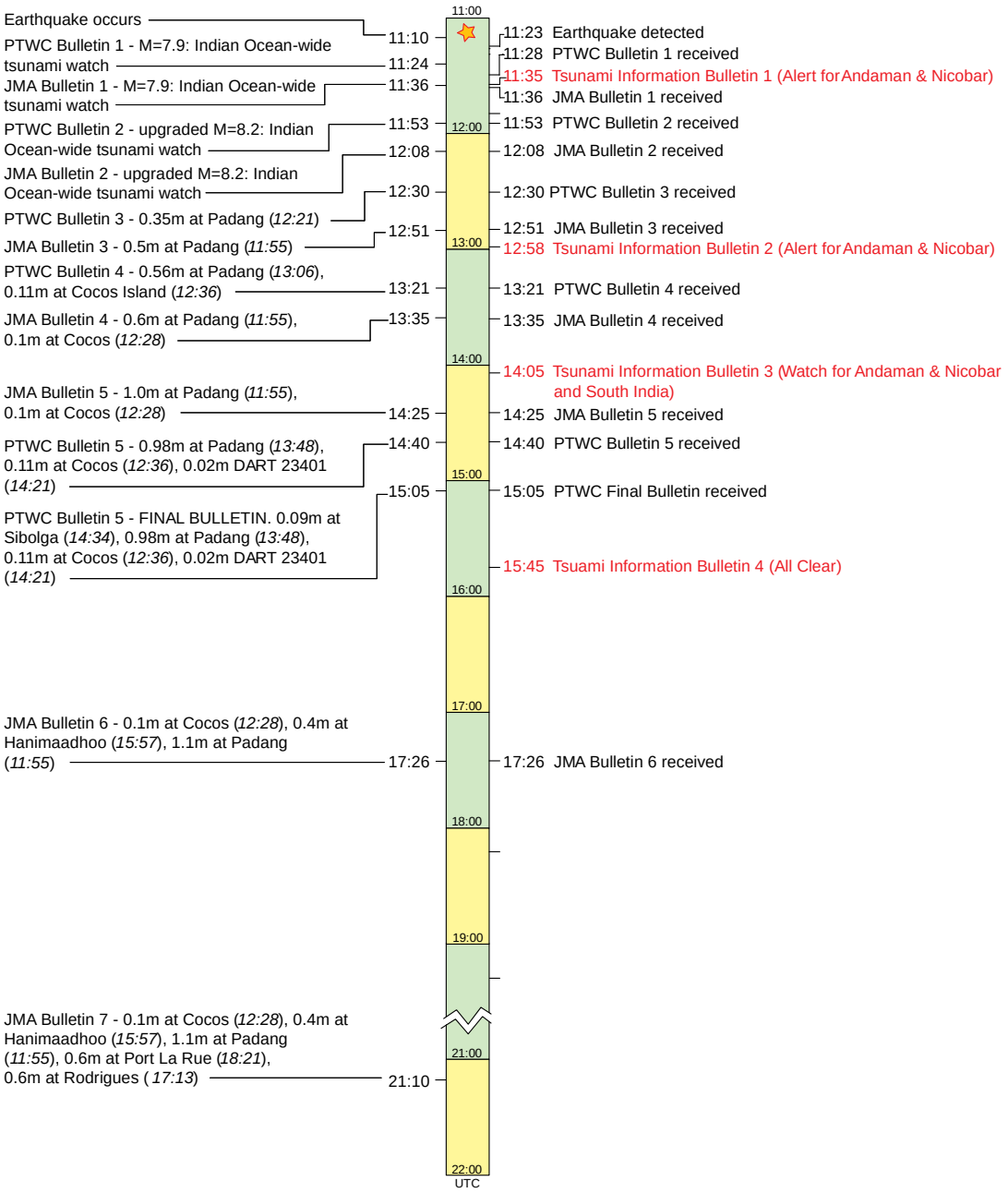
- Tsunami bulletins from JMA and PTWC were received by fax, GTS and email. The average time delay for receiving warning bulletins by email from PTWC is larger (often >20 minutes) than from JMA (often only a few minutes.

- A tsunami warning was issued at 14:00 for the shores and principal harbour. A wave height forecast for 0.5 to 2 metres was provided. No areas were evacuated.

- The tsunami warning was cancelled at 01:00, 13 hours after the warning was issued.

- Sea level data were not monitored during the event.

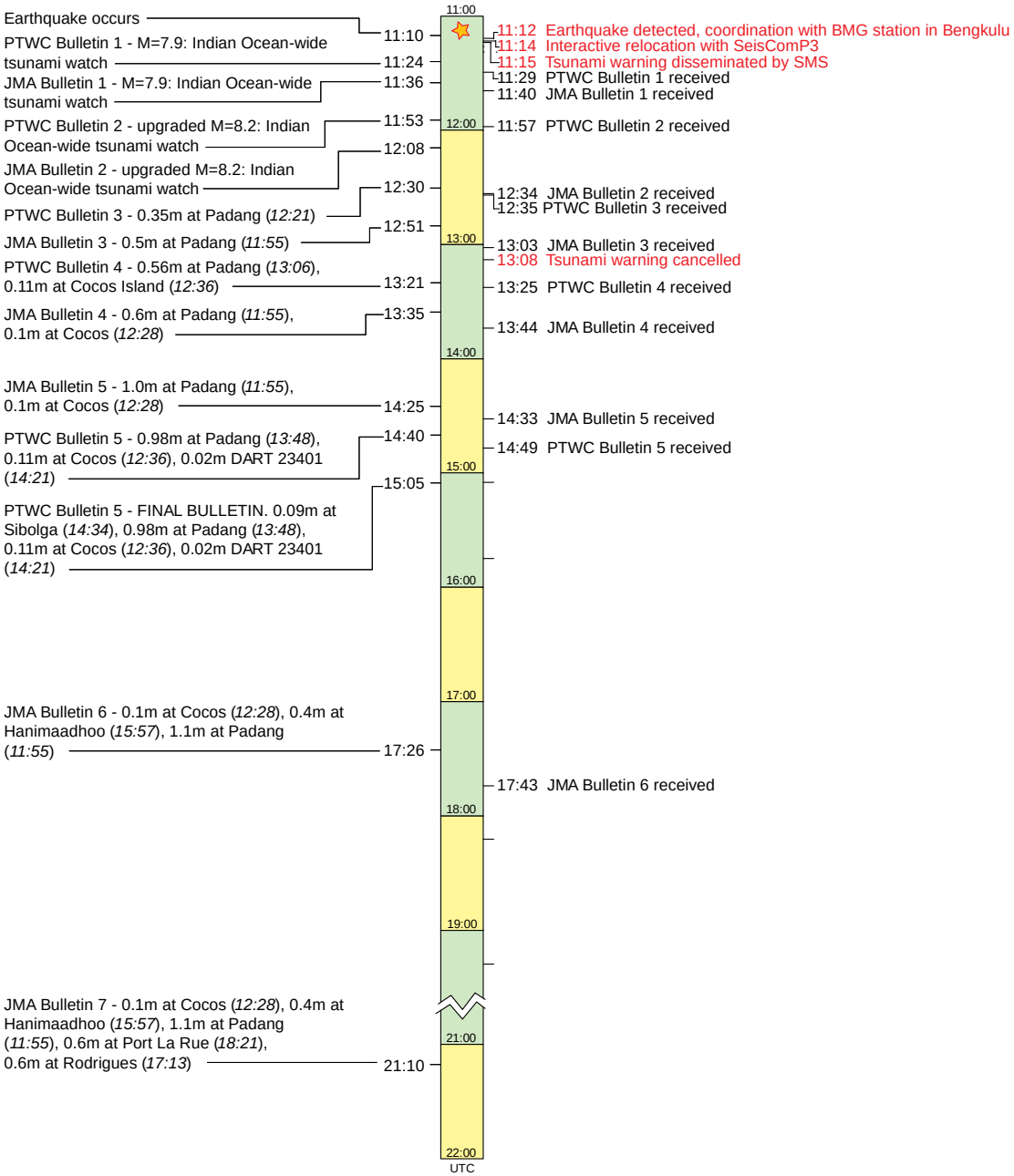
4.4 INDIA



Country Commentary

- Tsunami bulletins from JMA and PTWC were received within a few minutes of being issued.
- Earthquake parameters were estimated within 13 minutes of the earthquake event. A tsunami alert was issued for the Andaman and Nicobar Islands at 11:35, 25 minutes after the earthquake event. Two further bulletins were issued at 12:58 and 14:05.
- Pre-run model scenarios were used to estimate the expected arrival time of the wave, wave height and direction. Data from the Indian tsunami buoys and tide gauges were analysed in real-time.
- The tsunami warning was cancelled at 15:45, 4 hours and 35 minutes after the earthquake.
- No evacuations were ordered by the responsible government agency, the Ministry for Home Affairs. However, evacuations were ordered by the Orissa State Government based on PTWC's evaluation. India plans to conduct more awareness campaigns to educate administrators and the public about the tsunami warning process

4.5 INDONESIA



Country Commentary

- The earthquake was detected less than two minutes after it occurred. Interactive relocation with SeisComP3 software was completed within two minutes, and a tsunami warning was disseminated 4 minutes and 22 seconds after the event. A warning was broadcast on television at 11:17.
- The warning was issued using phone, fax, email, SMS, television and RANET. In general there were no communication problems, but there was difficulty connecting to Bengkulu area by phone when trying to confirm the tsunami.
- Sea level data from tide gauges were accessed in real-time over the GTS.
- There were no official evacuations, but people in the Bengkulu area self-evacuated before the warning was issued.
- Tsunami wave heights up to several metres were observed along the coast near Bengkulu and Padang, but there were no injuries or deaths reported from the tsunami.
- The tsunami warning was cancelled at 13:08, just less than two hours after the earthquake occurred.

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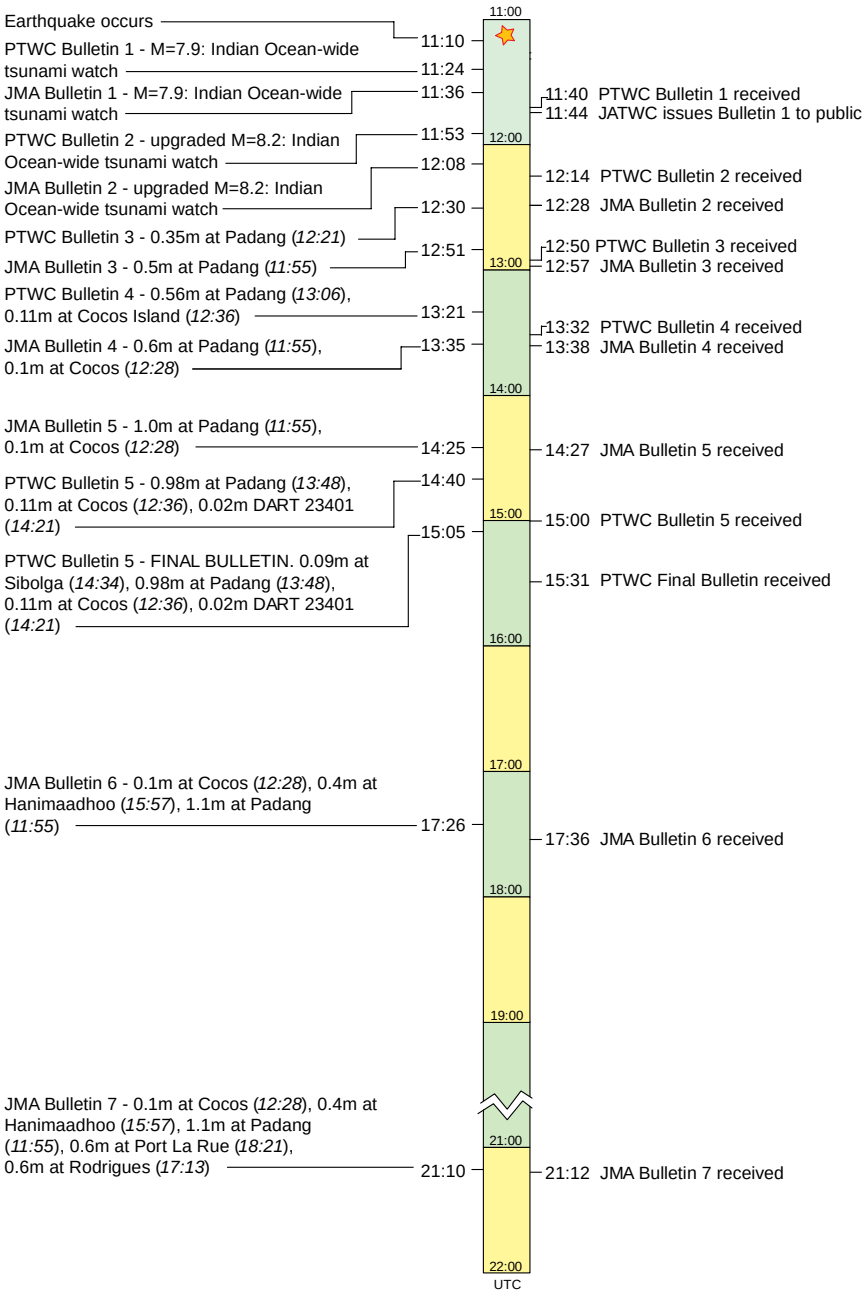
4.6 IRAN



Country Commentary

- Tsunami bulletins from JMA and PTWC were received via email, generally within 20 minutes of being issued.

- Following notification of the earthquake, the Tsunami Warning Focal Point evaluated the data and decided there was no threat to Iran. Therefore, no warning was issued and no further action was taken.

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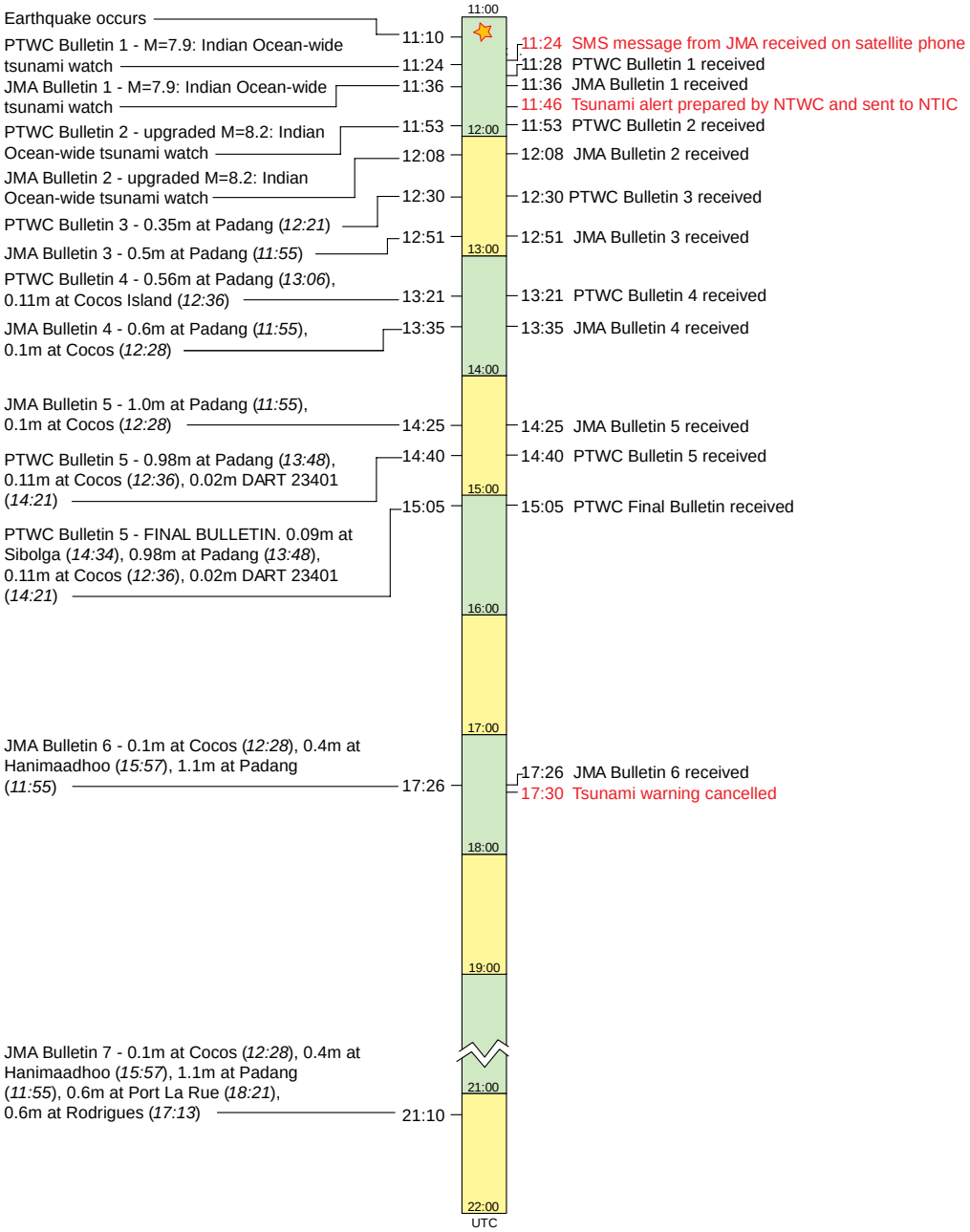
4.7 KENYA



Country Commentary

- Tsunami bulletins from JMA and PTWC were received within one minute of being issued. The first bulletin (from JMA) was received at 11:24 through the Satellite Phone provided by IOC.

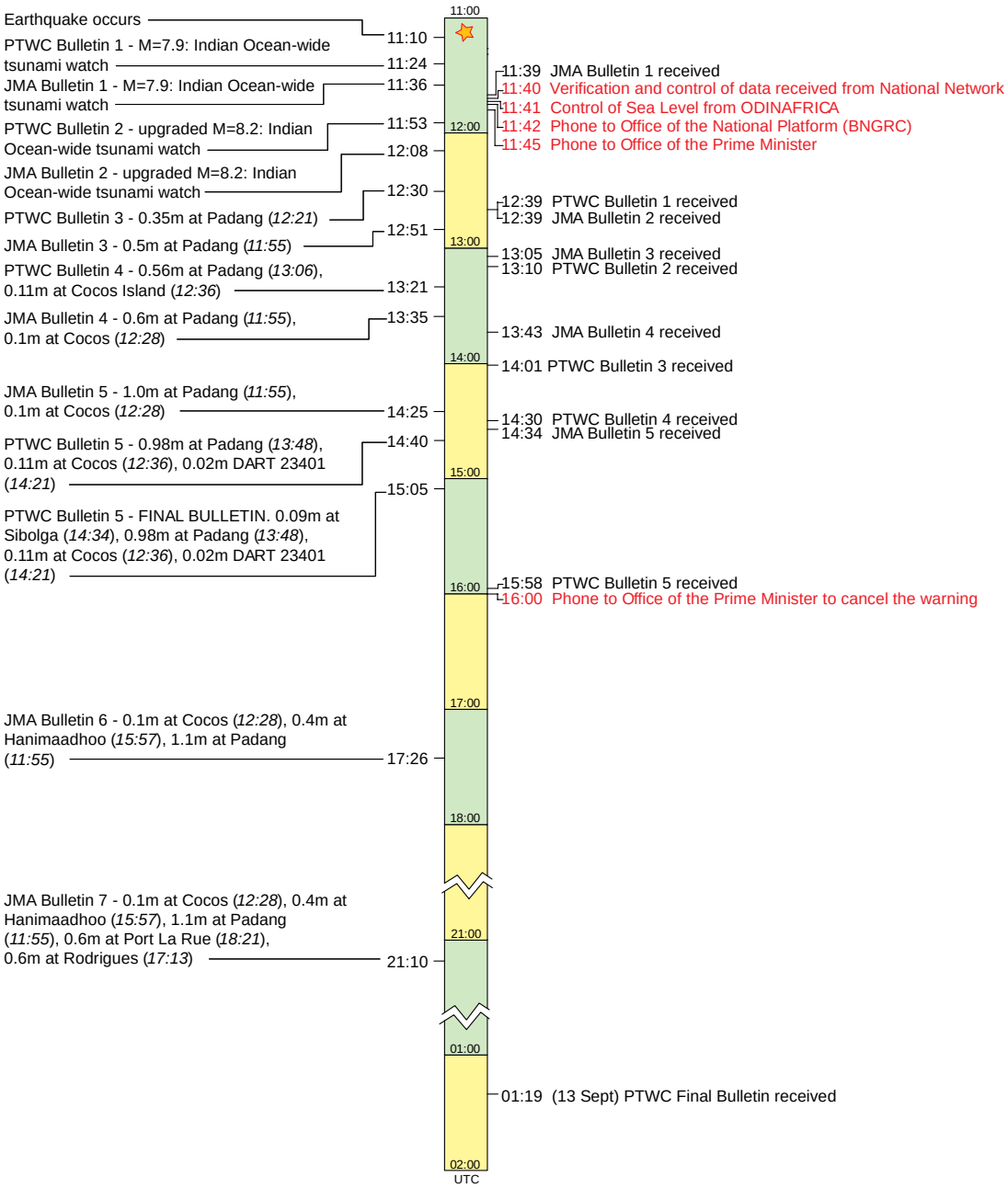
- A tsunami alert was sent to the NTIC at 11:46, 36 minutes after the earthquake occurred. The alert was disseminated by the National Disaster Operations Centre to the local coastal community, advising them to stay away from the ocean until further notice.

- At 11:55, the National Tsunami Information Centre issued a Tsunami Warning to the public through: Electronic media; Provincial, District and Local Administration/Police; Kenya Hotels and Tours Association; Kenya Ports Authority; Kenya Maritime Authority; Coast Development Authority; Kenya Boat Owners Association; Kenya Tourist Board.

- The alert was cancelled at 17:30 as no waves had reached the coast by the expected arrival time.

- Local sea level gauges were monitored during the event.

4.8 MADAGASCAR



Country Commentary

- Tsunami bulletins were received from JMA and PTWC, but the receipt of PTWC bulletins was delayed by up to 10 hours.

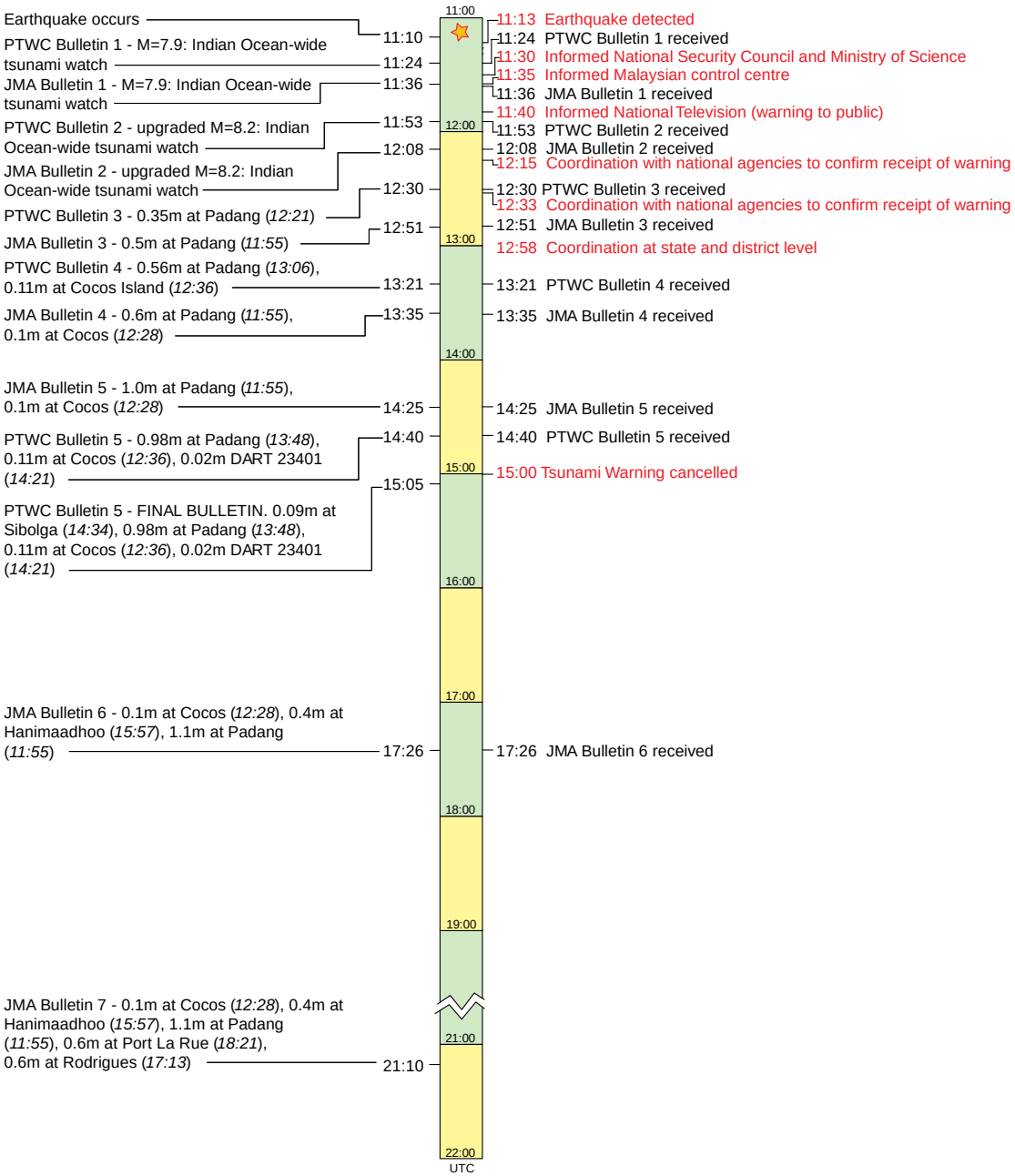
- No warning was issued to the public, but information was disseminated by phone to other government agencies, and also released to the media.

- Problems were encountered in reaching by phone the main persons at the level of the national platform.

- Sea level was monitored through ODINAFRICA, and numerical modelling scenarios were used during the event.

- The Office of the Prime Minister was informed of the warning cancellation at 16:00.

4.9 MALAYSIA



Country Commentary

- The earthquake was detected by the Malaysian national seismic network at 11:13. The preliminary earthquake information was sent to the national Disaster Management, Ministry of Science and mass media.

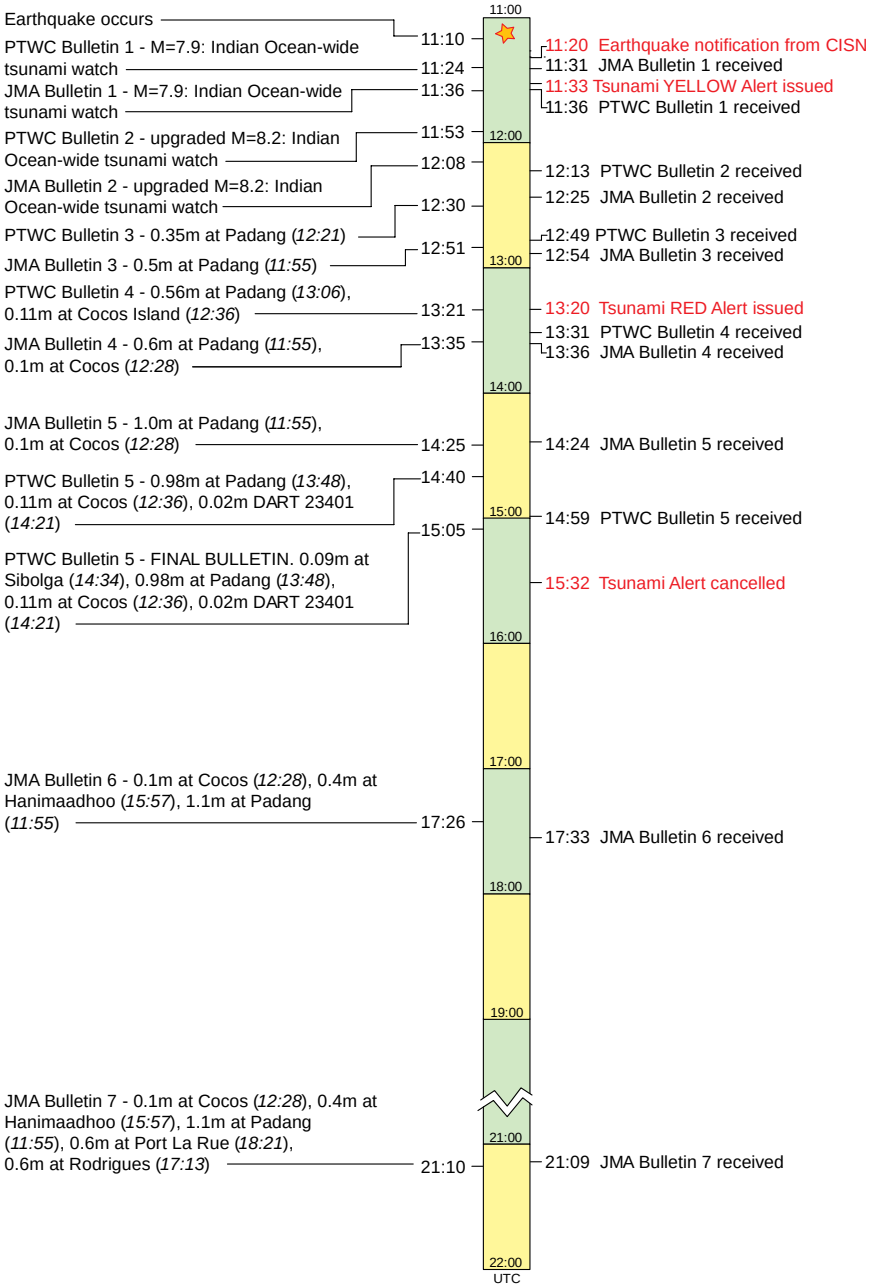
- Most of the tsunami bulletins from JMA and PTWC were received within a minute of issue; however, the final bulletin from JMA and the final bulletin from PTWC were not reported received.

- A tsunami warning was issued to the public at 11:40, thirty minutes after the earthquake. The warning was disseminated by phone, fax, email, SMS, Malaysian Meteorological Department web, radio and TV.

- Sea level across the region was monitored through GTS and ODINAFRICA.

- The tsunami warning was cancelled at 15:00, three hours and 50 minutes after the event. The cancellation was based on the fact that only a small tsunami was observed within the calculated travel time to the Malaysian coast.

4.10 MALDIVES



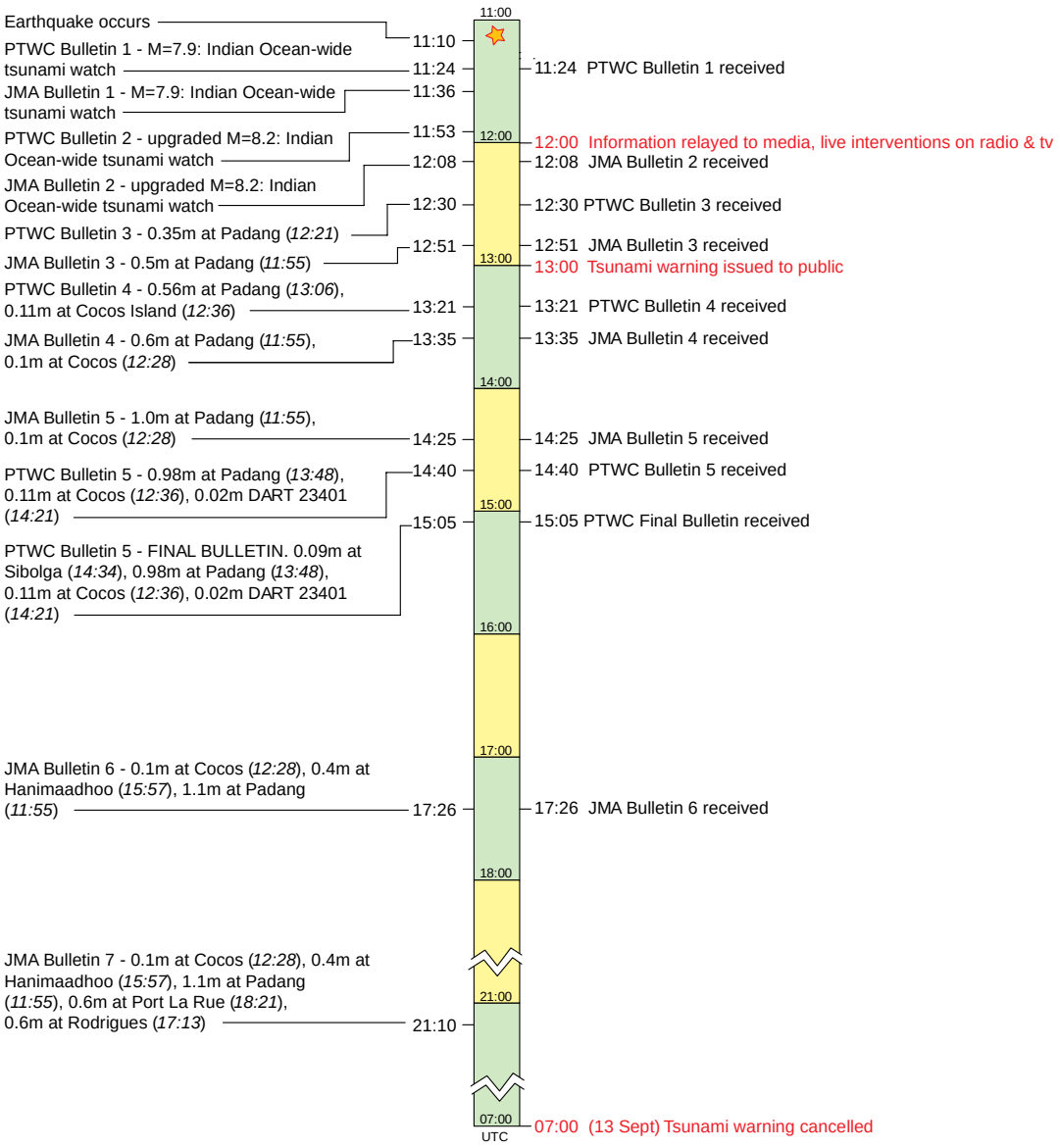
Country Commentary

- Tsunami bulletins from JMA were received within about 5 minutes from issue, and from the PTWC within about 30 minutes of issue.
- The earthquake was detected at 11:20 through the California Integrated Seismic Network (CISN). Information on the earthquake was dispatched to National focal points through hotlines and via SMS and fax to concerned authorities.
- A Yellow Alert (Earthquake and Tsunami advisory to authorities) was issued at 11:33. A RED alert (Tsunami warning to public) was issued at 13:20. The warning was disseminated by phone, fax, SMS, radio and TV.
- Communication problems with warning distribution occurred due to overloading of the mobile phone network.
- There were no official evacuations, but the public was advised to stay away from the coast and wait for media updates.

Sea level stations were monitored on the ODINAFRICA website.

- The warning was cancelled at 15:32 as no tsunami had been detected within the expected time frame.

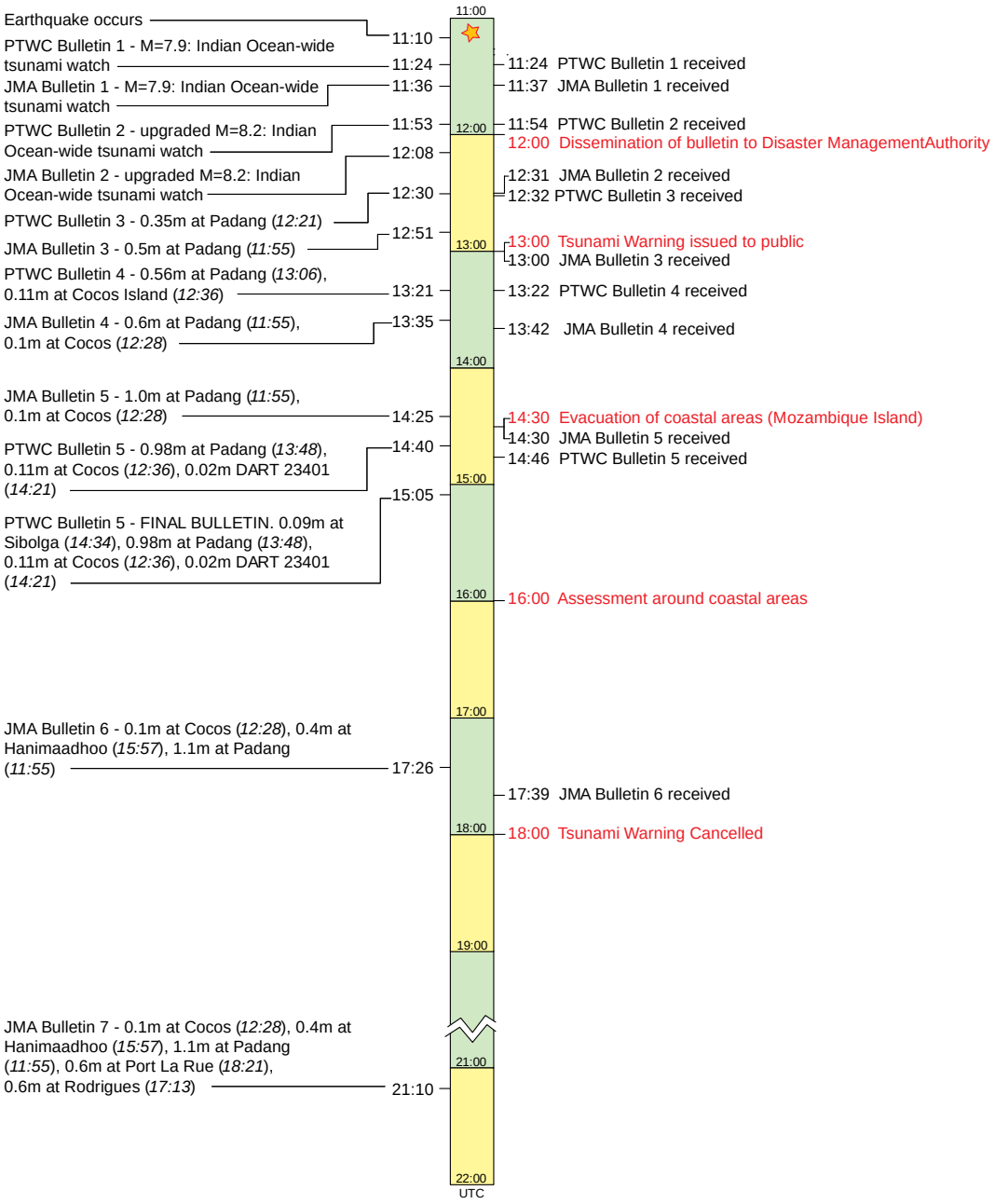
4.11 MAURITIUS



Country Commentary

- Most tsunami bulletins from JMA and PTWC were received within one minute of being issued, but several were not received at all (JMA bulletins 1 and 7, PTWC bulletin 2).
- Information was relayed to the media at 12:00 and live interventions were made on radio and TV.
- A tsunami warning to the public was issued at 13:00. Tourists and locals were advised to leave beaches, and the population was advised to be alert. There were no evacuations.
- Local tide gauges were monitored visually by the physical presence of staff members.
- The tsunami warning was cancelled at 07:00 on 13th September, 20 hours after the earthquake event.

4.12 MOZAMBIQUE



Country Commentary

- Tsunami bulletins from JMA were received within 15 minutes from issue, and PTWC bulletins were received within 5 minutes.

- The bulletins were disseminated to the Disaster Management Authority at 12:00, and an urgent meeting was held with the National Institute of Disaster Management, Mozambique Red Cross, Health, Police, Army and Marine Authorities.

- A tsunami warning to the public was issued at 13:00. The warning was disseminated by phone, fax, email, radio and TV.

- An elaboration of the public warning was issued at 14:30, and the public were recommended to evacuate to at least 150m from the coast. At 15:00, 2000 people were evacuated at Mozambique Island.

- The tsunami warning was cancelled at 20:30 as no tsunami had been detected within the expected time frame

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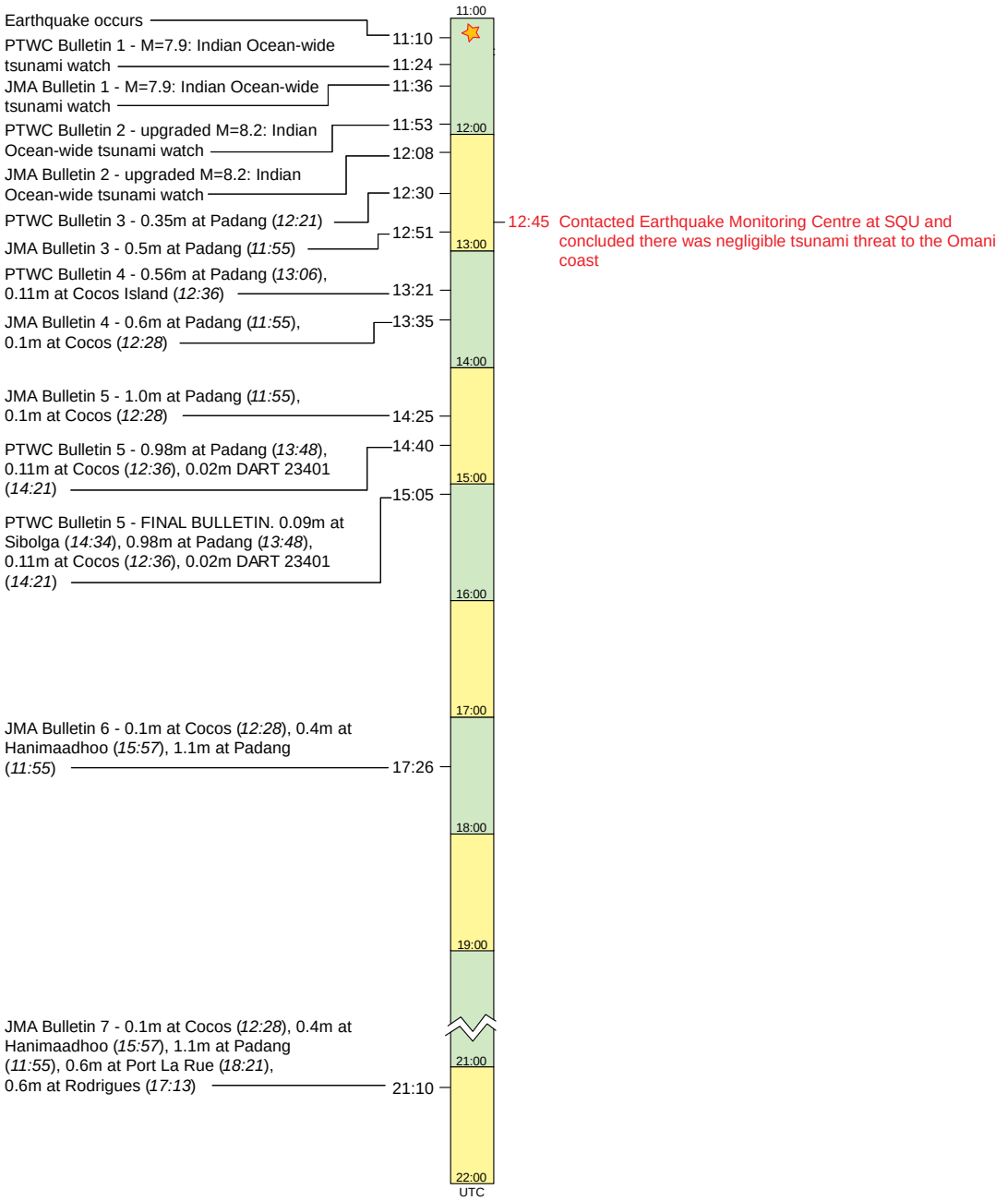
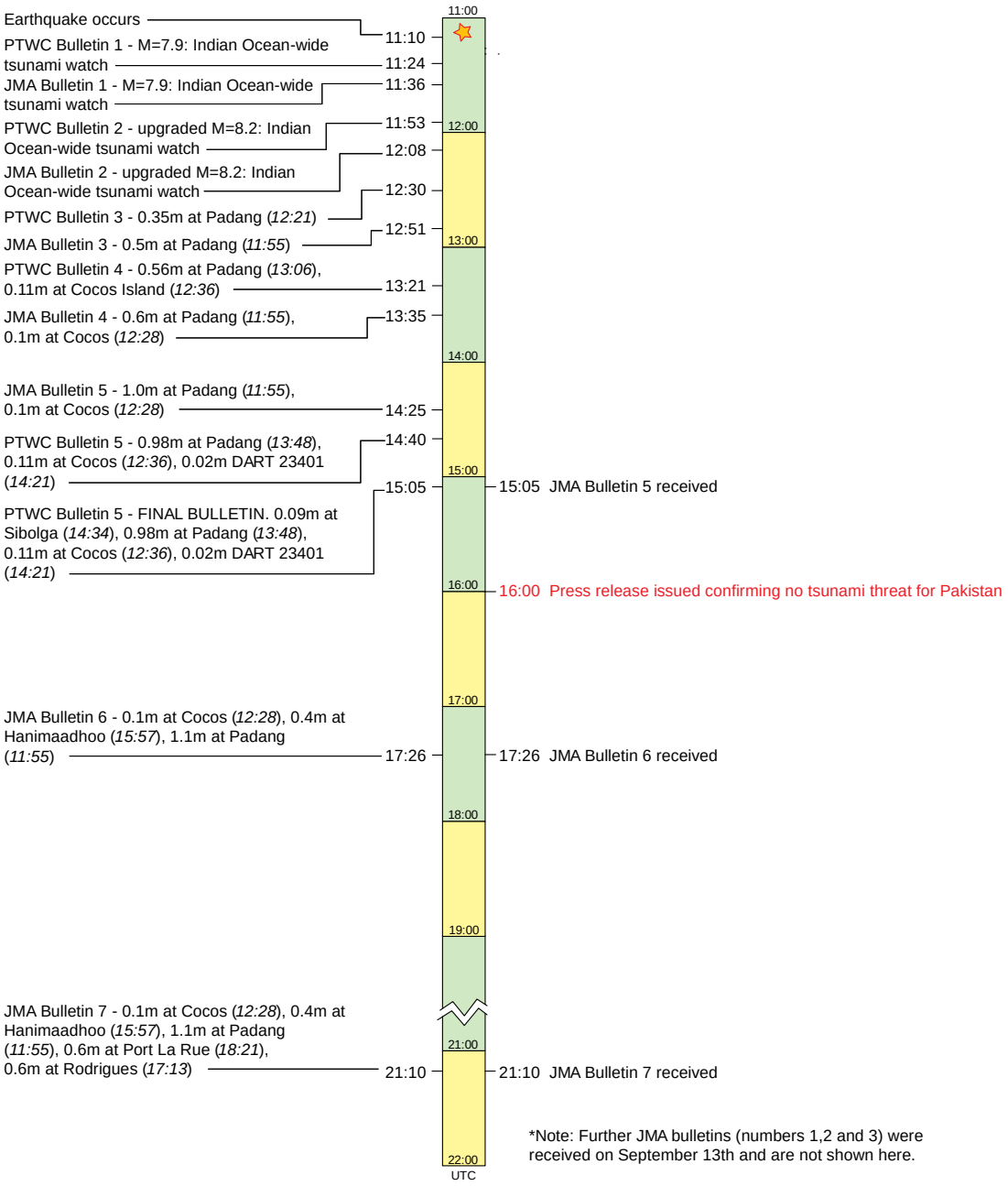
4.13 OMAN



Country Commentary

- One tsunami bulletin was received from JMA, and one from PTWC. Both were received at 12:30.
- The Earthquake Monitoring Centre at Sultan Qaboos University was contacted at 12:45, and it was concluded that there was negligible tsunami threat for Oman. No further action was taken.

4.14 PAKISTAN



Country Commentary

- The first tsunami bulletin to be received by Pakistan was JMA Bulletin 5, which was received via GTS at 15:05. JMA Bulletins 6 and 7 were received within one minute of being issued. JMA Bulletins 1, 2 and 3 were not received until the following day (13 Sept).

- The JMA bulletin was reviewed at 16:00, and it was concluded that there was

no threat to Pakistan. A press release was issued in this regard, and the National Disaster Management Authority was notified.

- The local sea level station at Karachi was monitored

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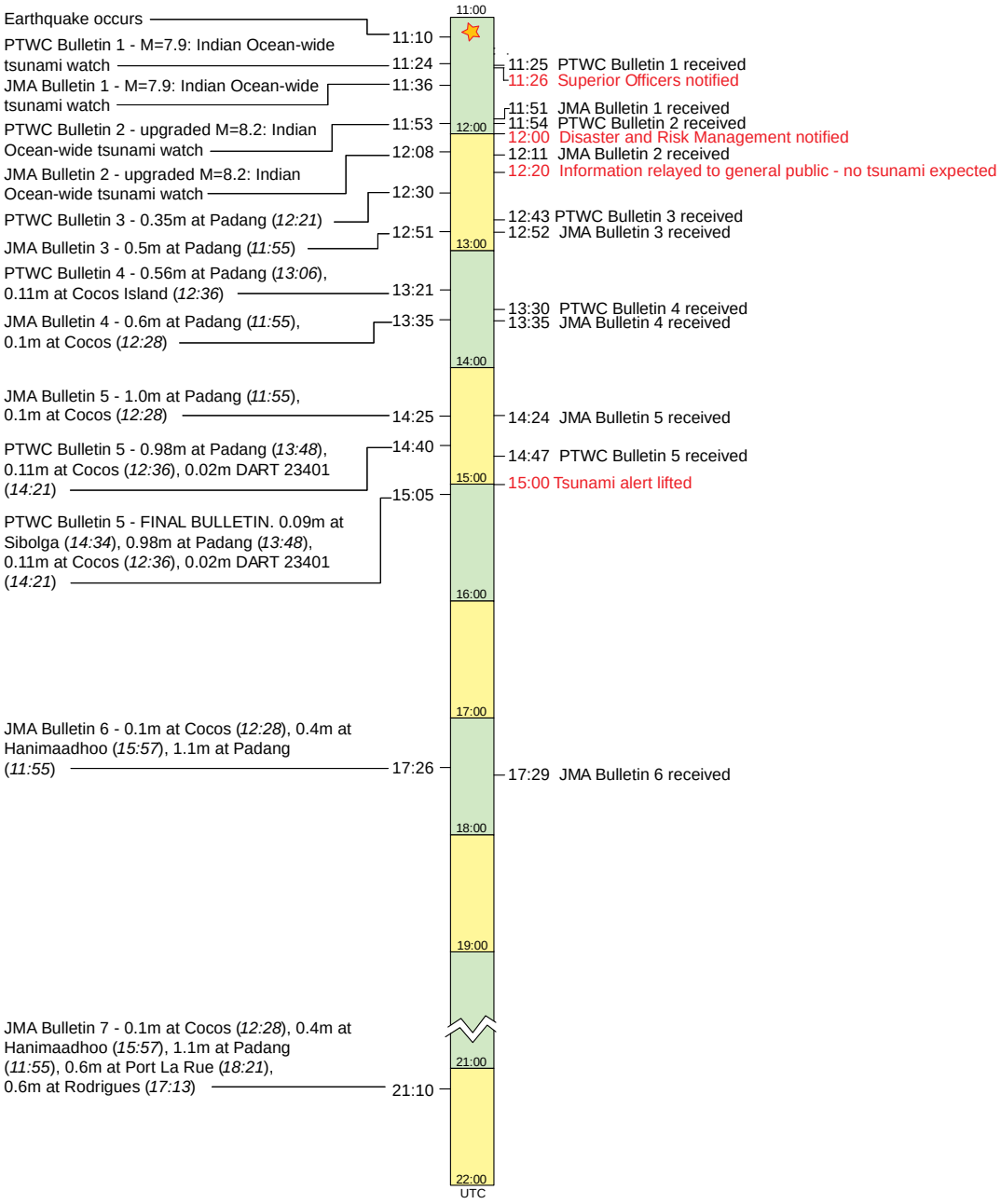
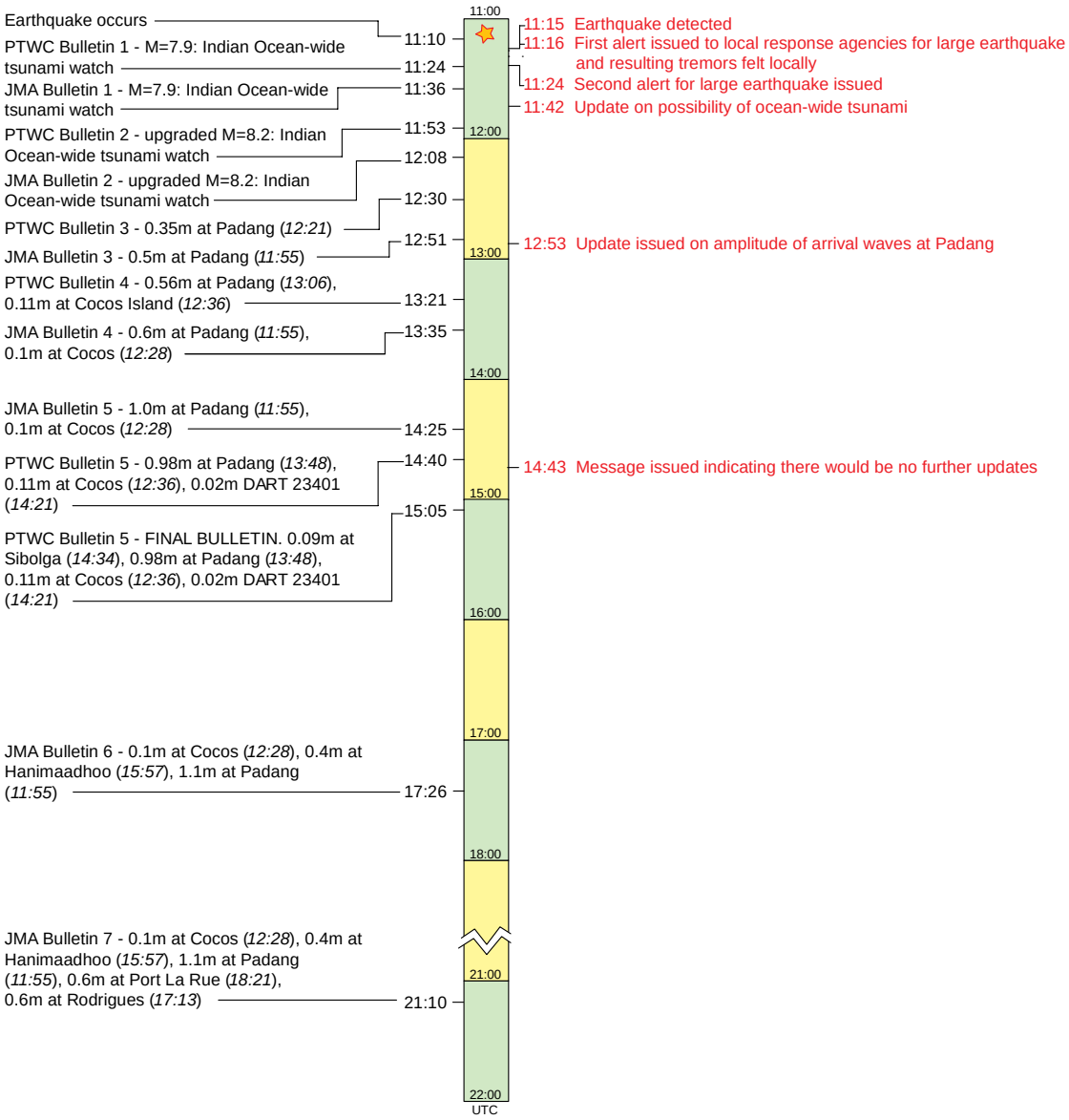
4.15 SEYCHELLES



Country Commentary

- Tsunami bulletins from JMA and PTWC were received within 15 minutes of issue.
- Disaster and Risk Management were notified at 12:00
- Information was relayed to the public via local radio at 12:20, stating that there was no significant impact expected.

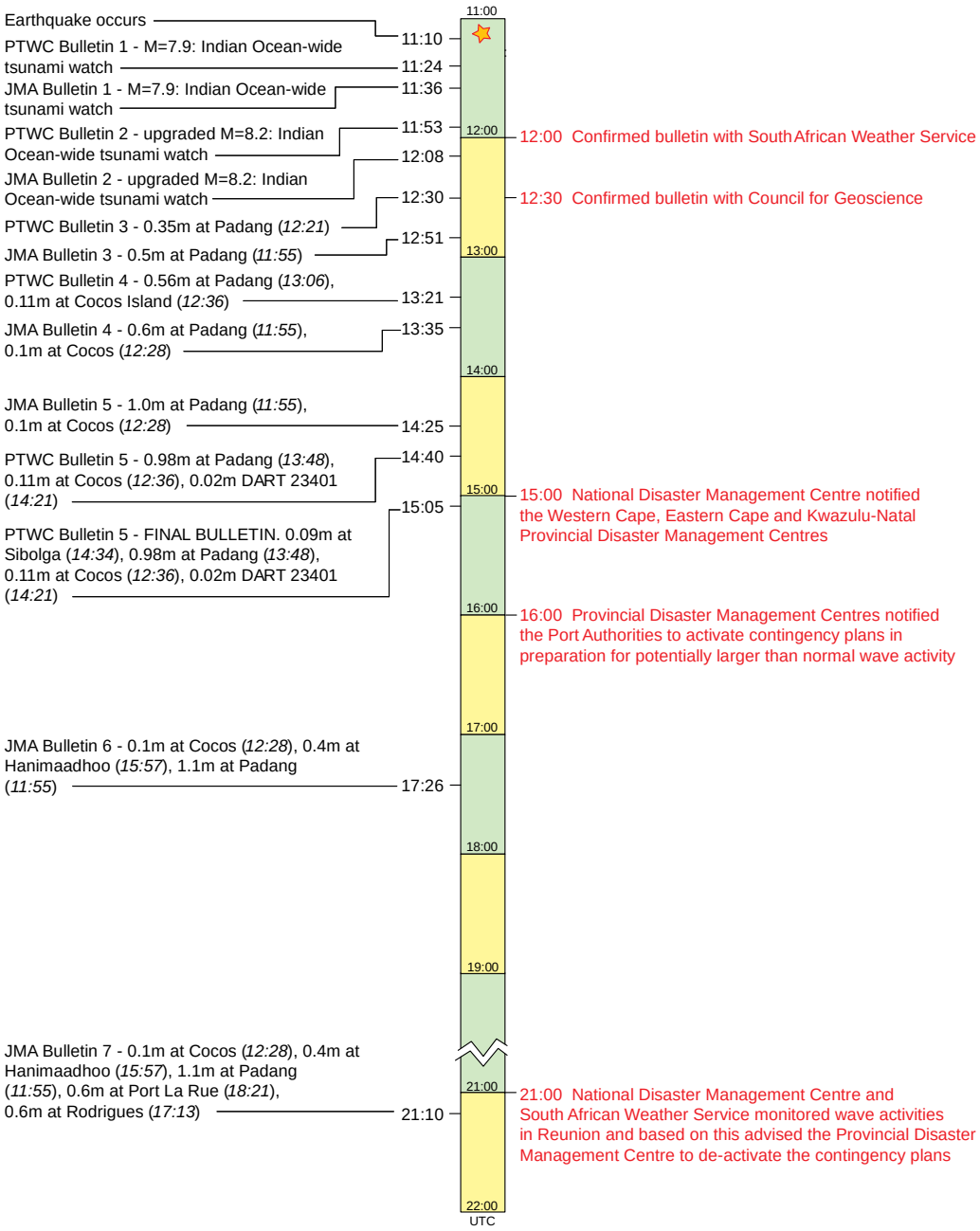
4.16 SINGAPORE



Country Commentary

- The earthquake was detected through Singapore's national monitoring system at 11:15.
- Tsunami bulletins were received, but specific times not noted.
- It was assessed that the tsunami generated from the earthquake was unlikely to affect Singapore. The alerts issued were mostly concerned with the tremors felt locally as a result of the earthquake and its aftershocks. The updates on tsunami were for information of the local response agencies.
- Alerts were sent to local response agencies regarding the earthquake and resulting tremors affecting Singapore.
- An update of the possibility of an ocean-wide tsunami was issued at 11:42
- The public was alerted about the large earthquake and updated on the possibility of tsunami in the region. A tsunami warning was not issued.

4.17 SOUTH AFRICA



Country Commentary

- Tsunami bulletins were received via fax from the PTWC, but not from JMA. However recorded times were not consistent and are not shown.

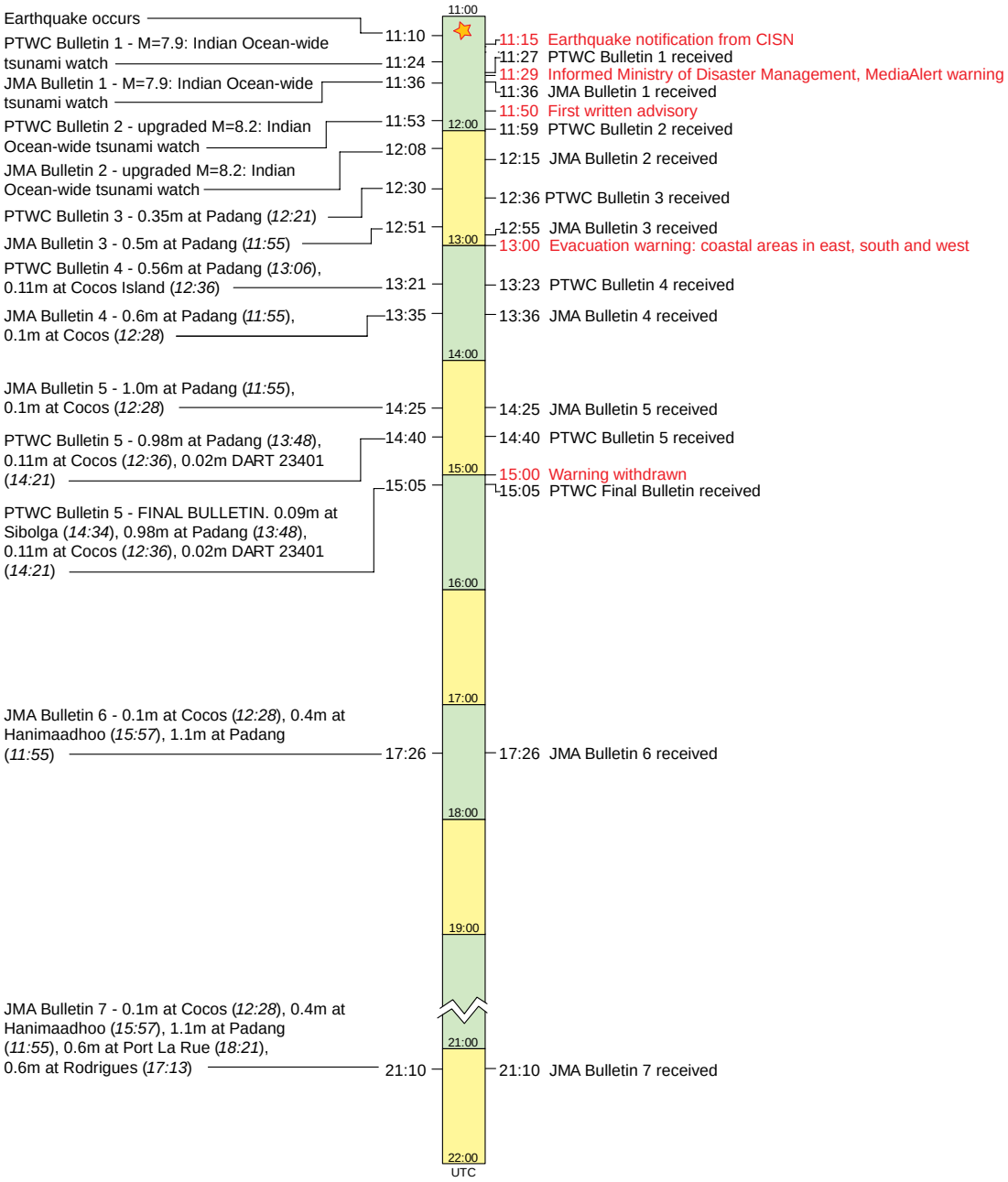
- At 12:00, the bulletin information was passed to the South African Weather Service and the Council for Geoscience

- At 15:00, the National Disaster Management Centre notified the Western Cape, Eastern Cape and Kwazulu-Natal Provincial Disaster management centres.

- At 16:00, the Provincial Disaster Management Centres notified the Port Authorities to activate contingency plans on preparation for potentially larger than normal wave activity.

- Contingency plans were de-activated at 21:00, based on monitoring of wave activities in Reunion.

4.18 SRI LANKA



Country Commentary

- The earthquake was detected through the California Integrated Seismic Network (CISN) at 11:15

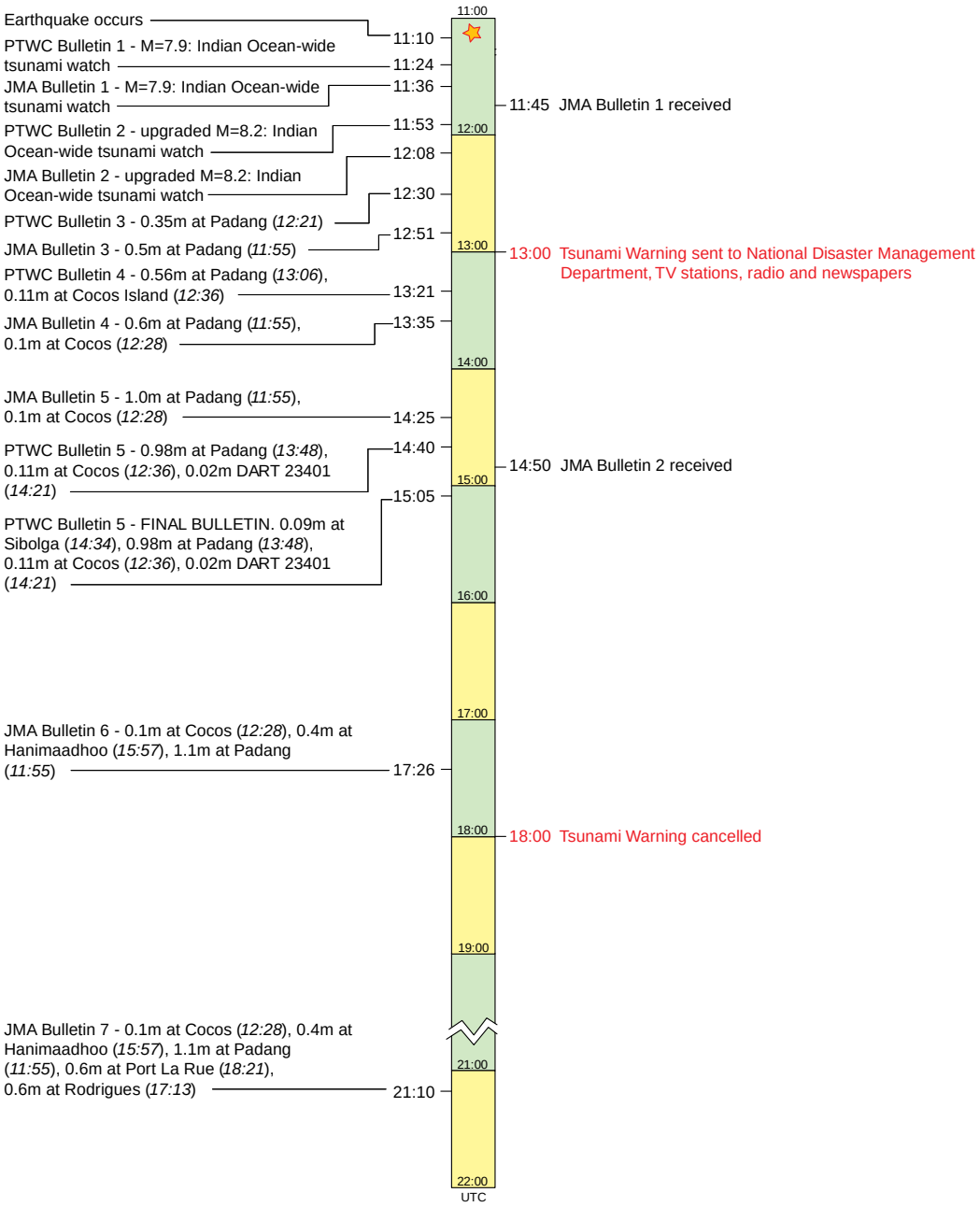
- Tsunami bulletins from JMA and PTWC were received within 5 minutes of issue.

- A tsunami warning was issued to the public at 11:50. An evacuation warning was issued at 13:00 for all people living near the coast in the Eastern Coastal, Southern and Western Coastal areas. The evacuation process happened smoothly and there were no self-evacuations prior to the warning being issued.

-The warning was disseminated via phone, fax, email, the Disaster Management Centre, media, Police and Army, Navy and Air Force, and via mobile phones. Communication problems were reported due to overloading of the phone network.

The tsunami warning was cancelled at 15:00, as checking of sea level gauges confirmed there was no destructive tsunami for Indian Ocean countries.

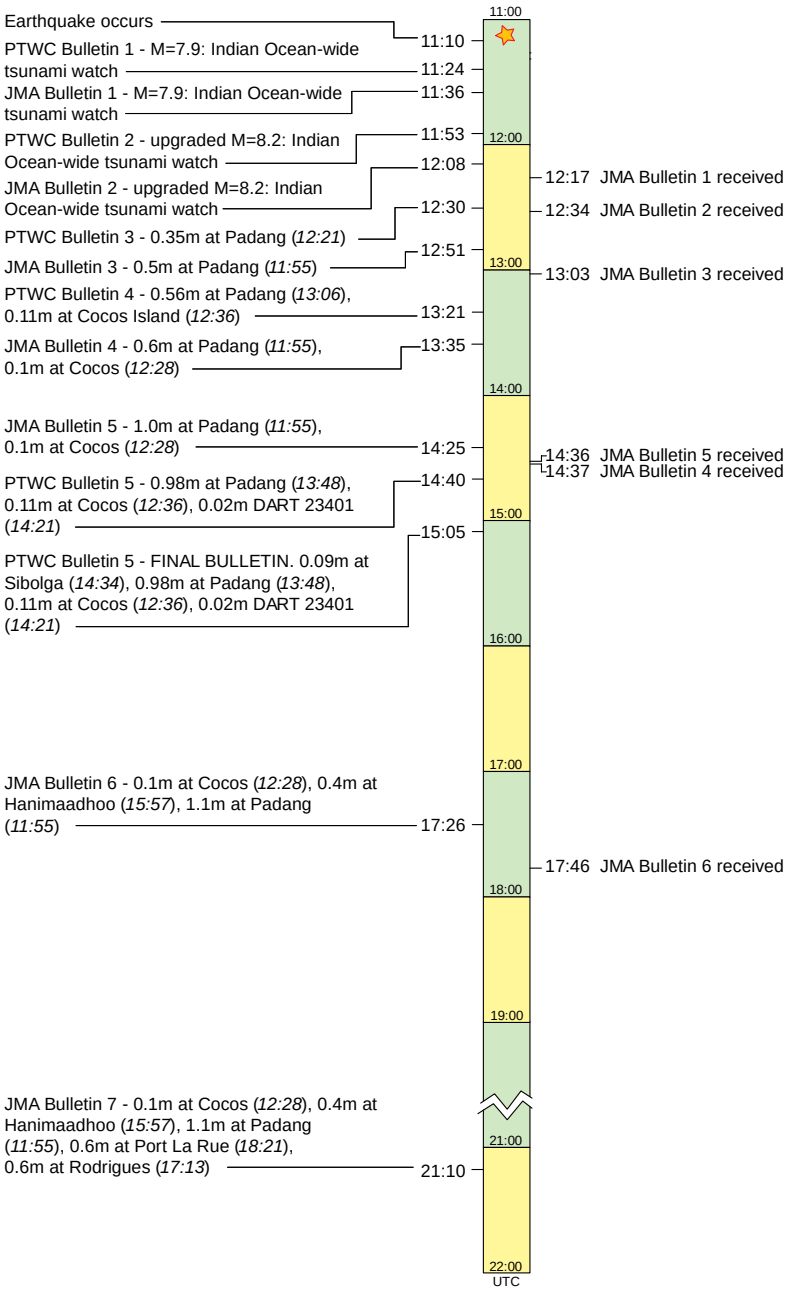
4.19 TANZANIA



Country Commentary

- Two tsunami bulletins were received via fax and email from JMA, and none from the PTWC.
- A tsunami warning was issued to the public at 13:25 via phone, fax, email, radio, television and newspapers. There were no official evacuations.
- The National Warning Centre did not monitor sea level, but did use numerical modelling scenarios during the event.
- The tsunami warning was cancelled at 18:00 after receiving information that no tsunami waves were generated.

4.20 TIMOR LESTE



Country Commentary

- Tsunami bulletins from JMA were received via email and satellite phone within 1 hour of issue. No bulletins were received from PTWC.
- No warning was issued.
- A 24/7 National Warning Centre is not yet in place. Currently, the National Disaster Management Directorate is only staffed during office hours. There is no emergency communications link to the community for quick warning issue.

4.21 THAILAND

Country Commentary

- Earthquake notification was received at 11:26 from the USGS website and the NDWC activated its SOPs at 11:26.
- A tsunami warning message was disseminated by SMS to all relevant agencies and local authorities in the risk area at 11:36. A public warning was not issued, and the siren towers on the coast were not activated.
- Official evacuations of approximately 2000 people at Phuket and 2000 people at Phangnga occurred at 12:00. Some self evacuations also occurred in areas where people accessed information from the internet.
- The tsunami warning was cancelled at 14:45 as the NDWC assessed there was no tsunami threat.
- The event was modelled using WinITDB, and sea level was monitored over the GTS.
- Following the event, the NDWC has revised its SOP to add more significant criteria into their decision system as well as altering the procedure of broadcasting the advisory. In future, the NDWC will broadcast the advisory, warning and updated information through the TV, rather than only broadcasting if there is a direct tsunami threat.

5. Survey Results

The member states' responses to the questions asked in the survey questionnaire have been compiled into tables and figures, as follows:

TABLES

Table 5.1 Summary of responses by countries to "yes/no" questions. *(Q2, 4, 5, 6, 7, 8, 9, 10, 12, 15, 17, 18, 19, 20)*

Table 5.2 Time of earthquake awareness by countries and how learnt . Time of receipt of first PTWC and JMA bulletins *(Q1, 2)*

Table 5.3 Time of receipt by countries of all PTWC and JMA bulletins. *(Q5)*

Table 5.4 Earthquake parameters calculated by countries. *(Q7)*

Table 5.5 Actions taken by countries before the first PTWC/JMA bulletin was received. *(Q8)*

Table 5.6 Actions taken by countries after the first PTWC/JMA bulletin was received. *(Q9)*

Table 5.7 Time of national warnings issued by countries. Time lapse between earthquake awareness and issuance of first warning. Source information on which the warning was based. *(Q10, 11)*

Table 5.8 Warning communication problems experienced by countries. *(Q15)*

Table 5.9 Time of warning cancellation for those countries that issued warnings (UTC). Time period between warning issuance and cancellation *(Q14)*

Table 5.10 Actions taken by National Disaster Management Organisations. *(Q16)*

Table 5.11 Evacuations by countries. *(Q17)*

Table 5.12 Sea level stations monitored by countries. *(Q20)*

FIGURES

Figure 5.1 Time of earthquake awareness expressed as lapsed time since earthquake

Figure 5.2 Time of official tsunami warnings issued by countries and modelled tsunami travel times.

Figure 5.3 Time of warning cancellation for countries that issued warnings and modelled tsunami travel times.

Figure 5.4 Countries were evacuations occurred and times of evacuation (UTC)

	Country	AUS	BAN	FR	IN	IND	IRN	KN	MAD	MAL	MD	MAU	MZ	OM	PK	SY	SIN	SA	SLK	TAN	THA	TL	Tot
INTERIM ADVISORY SERVICE	Received first bulletin from PTWC and/or JMA	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	**21**
	Acknowledged receipt of bulletin	●	○	○	○	●	○	○	●	●	○	●	○	○	●	○	○	○	○	●	●	●	**9**
	Received subsequent PTWC/JMA bulletin	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	**21**
	Received info from other sources	●	●	○	●	●	●	●	●	●	○	●	○	●	●	●	●	●	○	●	●	○	**16**
NATIONAL ACTIONS	Calculated earthquake parameter	●	●	●	●	●	○	○	●	●	○	●	○	●	●	○	●	○	○	○	●	○	**12**
	Action taken before bulletin	●	○	○	●	●	●	○	○	●	●	○	○	○	○	○	●	○	○	○	●	○	**8**
	Action taken after bulletin	●	●	●	●	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	**19**
	Issue national warning	●	●	●	●	●	○	○	○	●	●	●	●	○	○	○	○	○	●	●	●	○	**12**
	Forecasted wave height	○	○	●	●	○	n/a	n/a	n/a	○	○	○	○	n/a	n/a	n/a	n/a	n/a	○	○	○	n/a	**2**
	Communication Problem with warning	●	○	○	○	●	n/a	○	●	○	●	○	○	n/a	○	n/a	n/a	○	●	○	○	n/a	**5**
NATIONAL RESPONSE	Any area evacuated	○	●	○	●	●	○	○	○	○	○	○	●	n/a	○	n/a	n/a	○	●	○	●	n/a	**6**
	Smooth evacuation	n/a	●	n/a	●	●	n/a	n/a	n/a	n/a	n/a	n/a	●	n/a	n/a	n/a	n/a	n/a	●	n/a	●	n/a	**6**
	Self evacuation	○	○	○	○	●	○	○	○	○	○	○	○	n/a	○	n/a	n/a	n/a	○	○	●	○	**1**
MONITORING AND MODELLING	Monitored sea level	●	○	○	●	●	●	●	●	●	●	●	○	○	●	●	○	○	●	○	●	○	**13**
	- Accessed through GTS	○	n/a	n/a	●	●	○	○	○	●	○	○	n/a	n/a	○	●	n/a	n/a	○	n/a	●	n/a	**5**
	- Accessed through ODINAFRICA	○	n/a	n/a	○	○	○	●	●	●	●	○	n/a	n/a	○	○	n/a	n/a	●	n/a	○	n/a	**5**
	- Accessed through other systems	●	n/a	n/a	●	○	●	●	○	○	○	●	n/a	n/a	●	●	n/a	n/a	●	n/a	○	n/a	**8**
	Used numerical modelling	●	○	○	●	●	○	○	●	●	○	○	○	○	○	○	●	○	○	●	●	○	**8**

AUS=Australia, BAN=Bangladesh, FR=France (La Reunion), IN=India, IND=Indonesia, IRN=Iran, KN=Kenya, MAD=Madagascar, MAL=Malaysia, MD=Maldives, MAU=Mauritius, MZ=Mozambique, OM=Oman, PK=Pakistan, SY=Seychelles, SIN=Singapore, SA=South Africa, SLK=Sri Lanka, TAN=Tanzania, THA=Thailand, TL=Timor-Leste

●= yes, ○= no, n/a= not applicable, Tot= number answering yes

Table 5.1 Summary of responses by countries to “yes/no” questions.

Country	Time learnt	How learnt	PTWC	JMA
Australia	11:19	Geoscience Australia	11:24	11:36
Bangladesh	11:24	GTS	11:24	11:36
India	11:23	National & International Sources	11:28	11:36
Indonesia	11:12	National seismic monitoring system	11:28	11:23
Iran	11:40	Iranian National Disaster (Min of Interior)	11:40	12:28
Kenya	11:24	Text Message through the Tsunami Satellite	11:24	11:36
Madagascar	11:38	SMS/email	12:39	11:39
Malaysia	11:13	Malaysian National Seismic Network	11:24	11:36
Maldives	11:20	California Integrated Seismic Network	11:36	11:31
Mauritius	11:24	PTWC	11:24	12:08
Mozambique	11:24	PTWC, JMA	11:24	11:37
Oman		PTWC, JMA (time not noted)		
Pakistan	15:05	GTS & PMD's Seismic Network		00:09
Reunion	11:32	Fax	11:38	11:32
Seychelles	11:25	GTS/email/Fax/SMS	11:25	11:51
Singapore	11:15	National seismic monitoring system		
South Africa	*7:32*	Fax *(time as reported by South Africa)*	*7:32*	
Sri Lanka	11:15	California Integrated Seismic Network	11:27	11:36
Tanzania	11:45	Fax/email		11:45
Thailand	11:25	Website alert from USGS	11:26	11:28
Timor Leste	12:17	JMA (SMS message on satellite phone)		12:17

Table 5.2 Time of earthquake awareness by countries and how learnt . Time of receipt of ***first*** PTWC and JMA bulletins. All times are in UTC. See also Figure 5.1.

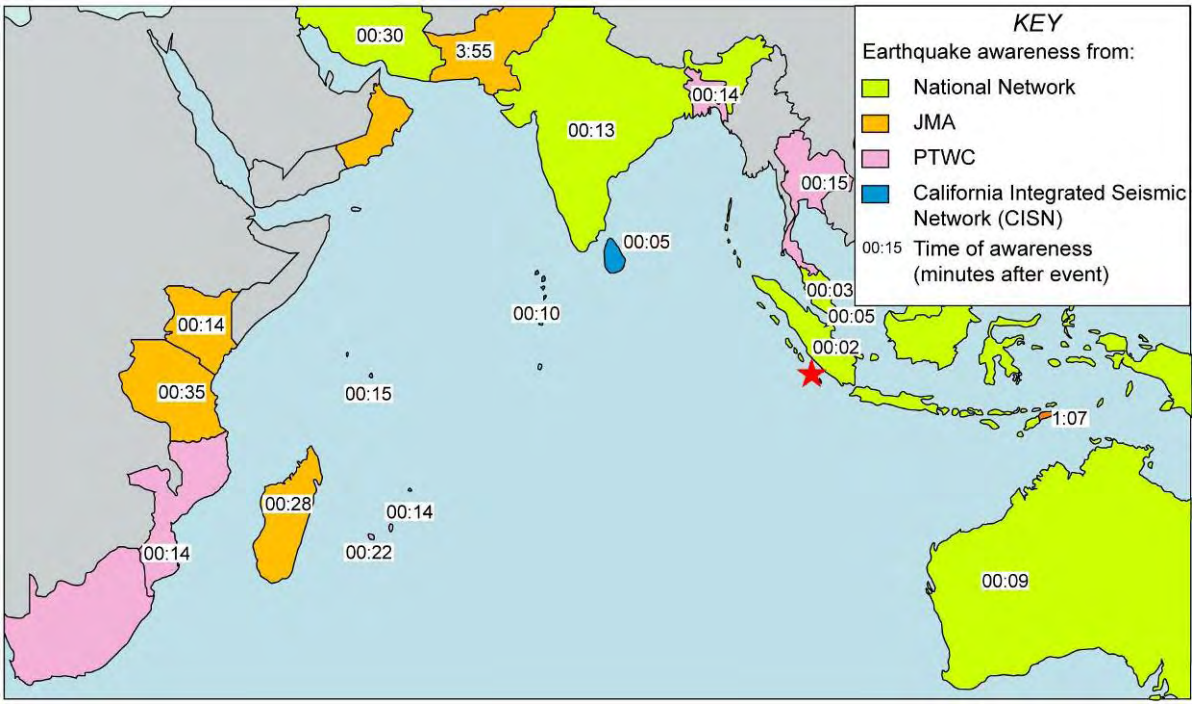


Figure 5.1 Time of earthquake awareness expressed as lapsed time since earthquake

Country	Agency	Bull. 1	Bull. 2	Bull. 3	Bull. 4	Bull. 5	Bull. 6	Bull. 7
Australia	JMA	11:36	12:08	12:51	13:35	14:25	17:26	21:10
	PTWC	11:24	11:53	12:30	13:21	14:40	15:05	
Bangladesh	JMA	11:36	12:08	12:51		14:25	17:21	21:10
	PTWC	11:24	11:53	12:30	13:21	14:40		
France	JMA	11:38	12:15	12:57	13:41	14:33	17:40	
	PTWC	11:32	12:20	12:39	13:32	14:55		
India	JMA	11:36	12:08	12:51	13:35	14:25	17:26	
	PTWC	11:28	11:53	12:30	13:21	14:40	15:05	
Indonesia	JMA	11:40	12:34	13:03	13:44	14:33	17:43	
	PTWC	11:28	11:57	12:35	13:25	14:49		
Iran	JMA		12:28	12:57	13:38	14:27	17:36	21:12
	PTWC	11:40	12:14	12:50	13:32	15:00	15:31	
Kenya	JMA	11:36	12:08	12:51	13:35	14:25	17:26	21:10
	PTWC	11:24	11:53	12:30	13:21	14:40	15:05	
Madagascar	JMA	11:39	12:39	13:05	13:43	14:34	17:46	
	PTWC	12:39	13:10	14:01	14:30	15:58	01:19 *	
Malaysia	JMA	11:36	12:08	12:51	13:35	14:25	17:26	
	PTWC	11:24	11:53	12:30	13:21	14:20		
Maldives	JMA	11:31	12:25	12:54	13:36	14:24	17:33	21:09
	PTWC	11:36	12:13	12:49	13:31	14:59		
Mauritius	JMA		12:08	12:51	13:35	14:25	17:26	
	PTWC	11:24		12:30	13:21	14:40	15:05	
Mozambique	JMA	11:37	12:31	13:00	13:42	14:30	17:39	
	PTWC	11:24	11:54	12:32	13:22	14:46		
Oman	JMA	Bulletins received but times not noted						
	PTWC							
Pakistan	JMA	00:09*	00:28*	03:02*		15:05	17:26	21:10
	PTWC							
Seychelles	JMA	11:51	12:11	12:52	13:35	14:24	17:29	
	PTWC	11:25	11:54	12:43	13:30	14:47		
Singapore	JMA	Bulletins received but times not noted						
	PTWC							
South Africa	JMA							
	PTWC	Bulletins received but times reported inconsistent						
Sri Lanka	JMA	11:36	12:15	12:55	13:36	14:25	17:26	21:10
	PTWC	11:27	11:59	12:36	13:23	14:40	15:05	
Tanzania	JMA	11:45	14:50					
	PTWC							
Thailand	JMA	11:44	12:14	12:56	13:40	14:32	17:39	
	PTWC	11:32	12:14	12:51	13:46	15:03		
Timor-Leste	JMA	12:17	12:34	13:03	14:37	14:36	17:46	
	PTWC							

* indicates bulletins received on 13th September

Table 5.3 Time of receipt by countries of all PTWC and JMA bulletins.

Country	Latitude (S)	Longitude (E)	Depth (Km)	Magnitude	Scale
Australia	4.3	101.4	30	7.8	Mwp
Bangladesh			34	8.4	Richter
France	4.833	101.5		8.2	
India	4.51	101.51	10	7.9	ML
Indonesia	4.67	101.13	10	7.9	RS
Madagascar	0.3	106.3	33	8	
Malaysia			20	7.9	Mb
Oman	3.775	102.1548	93	6.5	Mb
Pakistan			30	7.8	Mb
Singapore	4.8	101	50	8.5	Ms
Thailand	4.6	101.27	30	8.0	Richter

Table 5.4 Earthquake parameters calculated by countries.

Country	Action details
Australia	Automatically generated alert at Geoscience Australia (GA)'s "Antelope" system, to the Bureau of Meteorology's National Meteorological and Oceanographic Centre (NMOC). Both NMOC and GA form the Joint Australian Tsunami Warning Centre (JATWC). See attached
India	Tsunami Information Bulletin - 1 was issued by INCOIS to the Disaster Management Authority (MHA). This Bulletin contained Earthquake Information and Tsunami Alert for Andaman & Nicobar Islands.
Indonesia	Issued widely tsunami warning
Iran	Iranian National Disaster Task Force contact Dr. Chegini and He went there and through web search, they found that there will be no danger for Iran
Malaysia	Preliminary earthquake information from our system sent to National Disaster Management, Ministry of Science and Mass Media
Maldives	Information on earthquake were dispatched to National focal points through Hotlines and via SMS and Fax to concerned authorities.
Singapore	Alerts sent to local response agencies regarding the earthquake and resulting tremors affecting Singapore
Thailand	NDWC activated its SOP after receiving earthquake information from USGS which are alerting all involving staffs to be in position at NDWC, set up all equipment to be ready and monitor the situation

Table 5.5 Actions taken by countries before the first PTWC/JMA bulletin was received.

Country	Time	Details
Australia	11:40	Bureau of Meteorology's West Australian Regional Forecasting Centre (WARFC) contacts Fire and Emergency Services Authority (FESA) Communication Centre.
	11:44	Joint Australian Tsunami Warning Center (JATWC) issues first Tsunami Bulletin (public distribution)
	12:00	WARFC issues 1st tsunami warning for the Cocos and Christmas Islands.
	13:10	WARFC issues 2nd tsunami warning for coastal areas between Kuri Bay and Albany
	13:55	WARFC issues 3rd tsunami warning for coastal areas between Kuri Bay and Albany.
Bangladesh	12:30	Tsunami bulletin issued for coastal people
France (La Reunion)	11:47	Contact and inform local French governmental authorities
	14:15	Contact Meteorological Mauritius Authorities (MMA)
		Contact Comores Island
	15:40	Several exchanges of information (tide gauge data) with MMA
	01:00	End of warning (13th September)
India	11:35	Tsunami Information Bulletin - 1 (Alert for Andaman & Nicobar Islands)
	12:58	Tsunami Information Bulletin - 2 (Alert for Andaman & Nicobar Islands)
	14:05	Tsunami Information Bulletin - 3 (Watch for A&N & South India)
	15:45	Tsunami Information Bulletin - 4 (All Clear)
Indonesia	11:12	Live signal and alarm at BMG
	11:12	Coordination with BMG station in Bengkulu
	11:14	Interactive relocation with SeiscomP 3
	11:15	Disseminate information by SMS
Kenya	11:24	Tsunami Bulletin received at the National Tsunami Warning Centre (NTWC)
	11:46	Tsunami Alert prepared by NTWC and sent to the National Tsunami Information Centre (NTIC)- National (Disaster) Operations Centre
	11:55	National Tsunami Information Centre issued Tsunami Warning to the public
Madagascar	11:40	Verification and control of data received from the National Network
	11:41	Control of Sea Level from ODINAFRICA
	11:42	Phone to the Office of the National Platform (BNGRC)
	11:45	Phone to the Office of the Prime Minister
	16:00	Phone to the Office of the Prime Minister to cancel the warning
Malaysia	11:30	Informed National Security Council
	11:30	Informed Ministry of Science, Technology and Innovation
	11:35	Inform Malaysian Control Centre
	11:40	Informed National Television

Table 5.6 Actions taken by countries after the first PTWC/JMA bulletin was received

Country	Time	Details
Maldives	11:33	Alert level yellow issued
	11:45	Live interviews to media
	13:20	Alert level RED issued
	11:40	Voice of Maldives, Television Maldives, National Disaster Management Centre, Maldives National Defense Force, Maldives police Service, Min. of Information, Min. of Atolls, Min. Tourism, Min. of Health, Min. of Education, Telecommunication Authority, Coast Guard, President's Office
Mauritius		Secretary to Cabinet and Head of Civil Service were contacted
	12:00	Information was relayed to the Media and live interventions were made on radio and tv
	13:00	Special communiqué was issued and relayed to Police information room for onward transmission to Coast Guard
Mozambique	12:00	1. Dissemination of the bulletin to Disaster Management Authority
	13:00	2.Meeting INAM with Technical Council of Disaster Management
	14:30	3. Elaboration of public warning and dissemination
	16:00	4. Assessment around coastal areas
Oman	12:45	Contacted Earthquake Monitoring Centre and discussed the possibility of tsunami arrival on Omani coast; concluded that the threat was negligible and hence took no further steps
Pakistan	16:00	Press release issued to Media stating there is no threat to Pakistan. National Disaster Management Authority notified.
Seychelles	11:26	Superiors Officers notified / Monitoring of subsequent information
	12:00	Disaster and Risk Management notified
	12:20	Contacted local radio station to relay information to General Public
Singapore	11:42	Update on possibility of ocean-wide tsunami.
	12:53	Update issued on amplitude of arrival waves at Padang
	14:43	Message issued indicating there would be no further updates
South Africa	12:00	Confirmed Bulletin with the South African Weather Service
	12:30	Confirmed Bulleting with the Council for Geoscience
Sri Lanka	11:29	Informed Ministry of Disaster Management, DMC, Media
	11:50	First Written advisory
	13:00	Evacuation Warning
	13:00	Continuous Monitoring
	15:00	Warning Withdrawn
Tanzania	13:00	Tsunami Warning was sent to the following: National Disaster Management Department, National Television and Private Television Stations, National Radio and Private Radio Stations, National Newspapers and Private Newspapers
Thailand	11:26	Active internal alarm for alerting NDWCofficers
	11:27	Examine operation readiness of NDWC officers and equipment
	11:30	Dissemination by SMS/Tel to Executive Director Governor on risk area

Table 5.6 ***(cont…)*** Actions taken by countries after the first PTWC/JMA bulletin was received

Country	Earthquake Notification	Warning issued	Time lapse (h:mm)	Information for warning
Australia	11:19	11:44	0:25	National TWC
Bangladesh	11:24	12:30	1:06	PTWC and JMA
France	11:32	14:00	2:28	PTWC and JMA
India	11:23	11:35	0:12	National TWC
Indonesia	11:12	11:15	0:03	National TWC
Malaysia	11:13	11:40	0:27	PTWC, JMA and National TWC
Maldives	11:20	13:02	1:42	PTWC and JMA
Mauritius	11:24	13:00	1:36	PTWC and JMA
Mozambique	11:24	13:00	1:36	PTWC and JMA
Sri Lanka	11:15	11:50	0:35	PTWC and JMA
Tanzania	11:45	13:25	1:40	PTWC and JMA
Thailand	11:26	11:30	0:04	National TWC

Table 5.7 Time of national warnings issued by countries (UTC). "Time lapse" is period between earthquake awareness and issuance of first warning. "Information for warning" is the source on which the warning was based. See also Figure 5.2

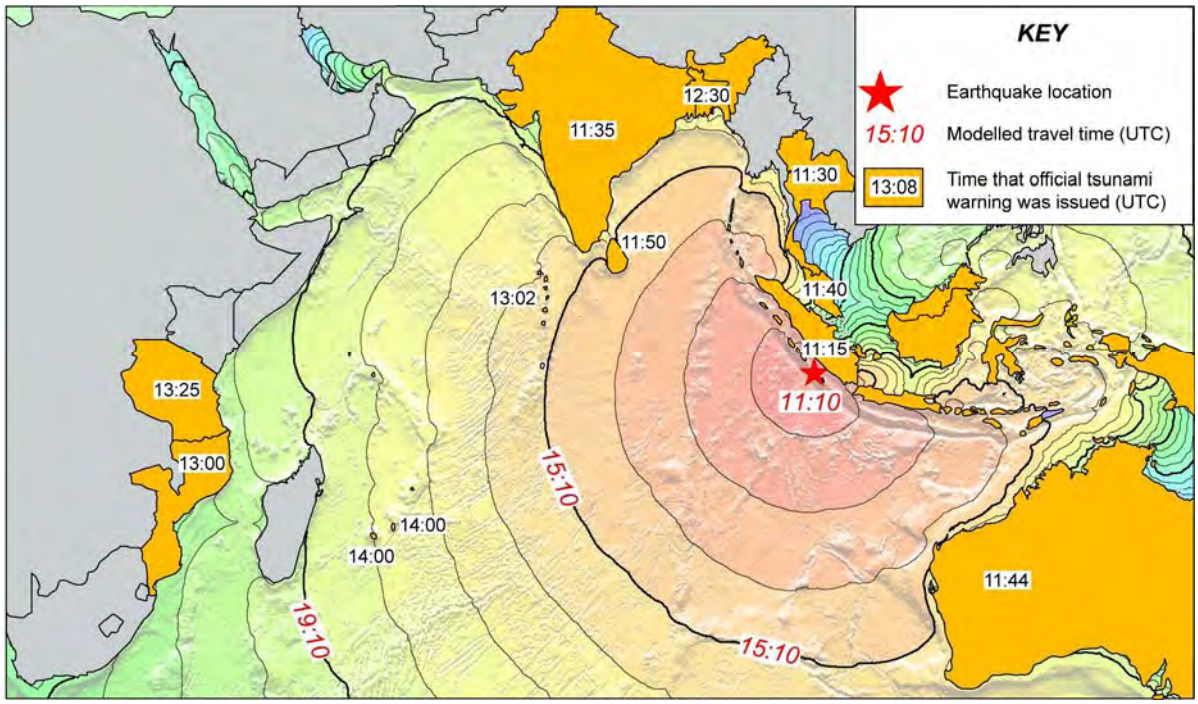


Figure 5.2 Time of official tsunami warnings issued by countries and modelled tsunami travel times. All times in UTC.

Country	Details
Australia	None for JATWC tsunami bulletin or the WARFC Cocos and Christmas Island warnings, though local addressing problems with the WARFC mainland warning. However, relevant emergency service agencies received the relevant warning/bulletins.
Indonesia	For obtaining confirmation of tsunami, there was difficulties of connecting to Bengkulu areas by phone
Madagascar	The main persons at the level of the national platform were not reachable
Maldives	Mobile phone network overloaded
Sri Lanka	Overloading of phones

Table 5.8 Warning communication problems experienced by countries.

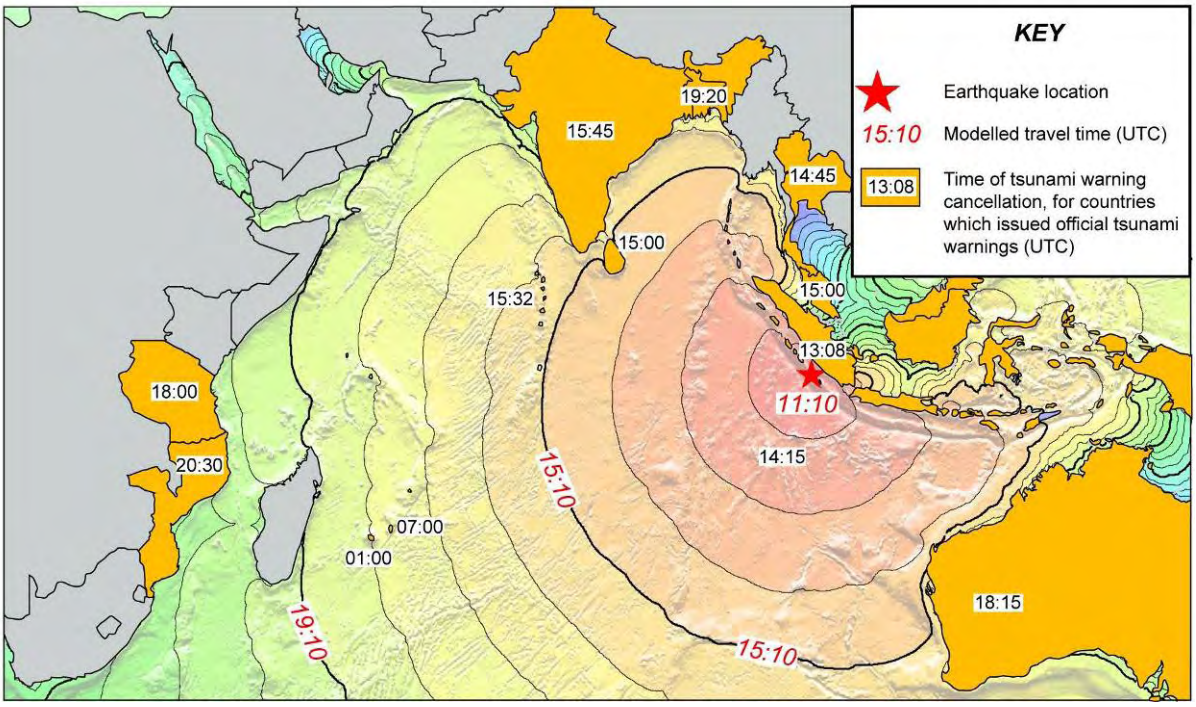


Figure 5.3 Time of warning cancellation for countries that issued warnings and modelled tsunami travel times. All times in UTC.

Country	Time of warning	Cancel time	Time on alert (hh:mm)	Reason for cancellation	Mode of cancellation
Australia	11:44	14:15	2:31	Threat passed for Cocos/ Christmas Island	Phone, fax, email, SMS
	11:44	18:15	6:31	Threat passed for mainland	Phone, fax, email, SMS
Bangladesh	12:30	19:20	6:50	After passing the expected time of arrival.	Fax, email, TV, radio
France (La Reunion)	14:00	01:00 (13 Sept)	11:00	End of Risk	Radio and television
India	11:35	15:45	4:10	Water Level Observations did not show significant changes	Phone; Fax
Indonesia	11:15	13:08	1:53	Rough estimate of last tsunami reflected by the islands, approximately 90 minute cancelled after 2 hours	Phone, fax, email, SMS, television, RANET
Malaysia	11:40	15:00	3:20	Only small local tsunami observed and exceed tsunami travel time to Malaysian coast	TV, SMS, MMD Web, Phone, Fax
Maldives	13:20	15:32	2:12	No Tsunami detected within the expected time frame	SMS, Fax, TV, Radio, Hotline
Mauritius	13:00	07:00 (13 Sept)	18:00	Wave heights recorded were not consequent and probability of high amplitude waves were minimum	Radio and TV
Mozambique	13:00	20:30	7:30	The tsunami was expected to affect coast of Mozambique between 19:00 to 11:00 UTC. The Technical council decided to form small group for monitoring the state of the sea. After concluding that nothing was happening the group prepared report and instructed for cancellation	Radio and Television
Sri Lanka	11:50	15:00	3:10	Checking sea level gauges and confirmation of no destructive tsunami to any Indian Ocean Countries	Media, Police and other modes, Mobile phones
Tanzania	13:25	18:00	4:35	After receiving information that no tsunami waves were generated	Phone, Fax, Emails, Radios and Televisions
Thailand	11:36	14:45	3:15	No threat Tsunami	TV, Fax

Table 5.9 Time of warning cancellation for those countries that issued warnings (UTC). Time on alert indicates the time between warning issuance and cancellation. See also Figure 5.3

Country	Time	Response
Australia		After FESA received verbal advice prior to the first bulletin, they followed standard response procedures as necessary. FESA district offices were advised and close liaison with the WARFC was maintained regarding estimated arrival times and possible impact
Bangladesh	12:30 -15:30	Cyclone Preparedness Programme of Bangladesh Red Crescent Society took 1.5 Million coastal people to shelter (Usually used during Tropical Cyclone).
France (La Reunion)	14:00	Special measures in the principal harbour (getting under way of vessels) at La Réunion. Forbidding bath and walk on shores at La Reunion (with no practical difficulties due to the evening time).
India	11:35	The Ministry of Home Affairs alerted the State and District Administration
Indonesia		Contact with Satlak and Satkorlak. Coordination with TNI (Army), Welfare Department.
	23:00	Delivered TNI team with Hercules Air Force
	10:00	(13 Sept) Coordination with President
Kenya		The National Disaster Operations Center on receiving the warning from NTWC communicated the same to the local coastal community who included the fish and tourist industry were advised to stay away from the ocean as they awaited further communication.
Malaysia	12:15	National Operation Centre, National Security Council called Malaysian Control Centre (MCC), Royal Malaysian Police (RMP) to reconfirm whether the news was delivered to RMP from Malaysian Meteorological Department (MMD). MCC informed contingent Control Centre (CCC) and District Control Center (DCC) at State level and District level at Perlis, Kedah, Penang and Perak to Petrol, and asked people to stay away from the shoreline as advised by MMD.
	12:33	National Operation Centre, NSC called Operation Management Centre, Malaysian Fire and Rescue Department (FRD to reconfirm whether the news was delivered to RFD from MMD
	12:58	FRD Ops Centre informed that State and District level at Perlis, Kedah, Penang and Perak already noticed and they were directed to petrol and asked people to stay away from the shoreline as advised by MMD
		NSC, RMP and FRD waited for other circumstances from MMD
Maldives	13:20	Advised public to be away from the coast and move to higher buildings etc. Advised to be on alert and get updates via proper media
Mauritius		Tourists and locals were advised to leave beaches. Population was advised to be alert and not to venture on beaches and open sea.
Mozambique	12:00	Meeting INAM with Technical Council of Disaster Management
	13:00	Elaboration of public warning and dissemination
	14:30	Recommend people to evacuate at distance of about 150m from the coast
	16:00	Assessment around coastal areas
	20:00	Evaluation of the system through the local disaster management units
South Africa	15:00	The National Disaster Management Centre notified the Western Cape, Eastern Cape and Kwazulu-Natal Provincial Disaster Management Centers
	16:00	The Provincial Disaster management Centres notified the Port Authorities to activate contingency plans in preparation for potentially larger than normal wave activity
	21:00	The National Disaster management Centre and South African Weather Service monitored wave activities in Reunion and based on this advised the Provincial Disaster Management Centre to de-activate contingency plans
Sri Lanka		Dissemination of the warning issued by Dept. of Meteorology assisting for evacuation
Tanzania		National Disaster Management organization informed the public and other relevant preparedness teams
Thailand		The Governors will be the director of disaster operation to direct and operate follow tsunami warning and mitigation plan if evacuation and assistant are needed as situation occurs

Table 5.10 Actions taken by National Disaster Management Organisations.

Country	Warning Time	Evacuation Area	Evacuation Time	Number of people evacuated
Bangladesh	12:30	Within the command area of Cyclone Preparedness Pr	12:30	1,500,000
India	11:35	Coastal districts in state of Orissa *(ordered by State Government, not national Ministry of Home Affairs)*		
Indonesia		Self evacuation occurred in Bengkulu, Muko-Muko, and Mentawai		
Mozambique	13:00	Mozambique Island	15:00	2,000
Sri Lanka	11:50	Complete Eastern Coastal	13:00	
		Southern, Western coastal		
Thailand	11:30	Phuket	12:00	2,000
		Phangnga	12:00	2,000

Table 5.11 Evacuations by countries. All times in UTC.

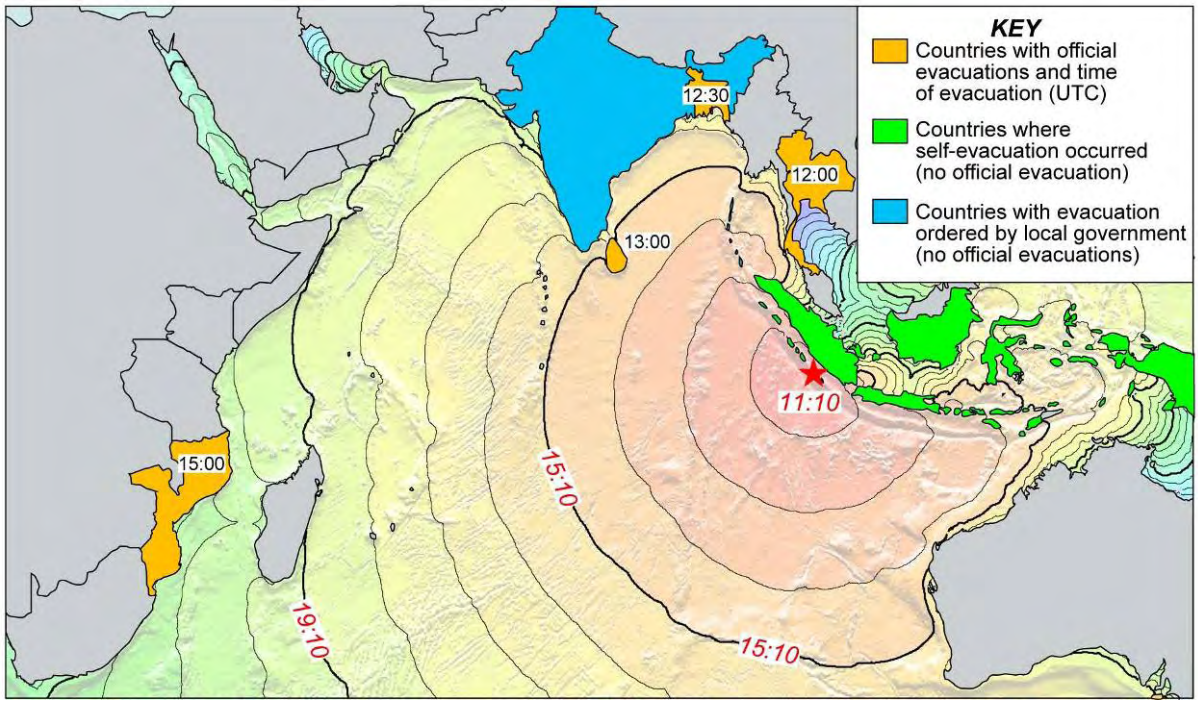


Figure 5.4 Countries where evacuations occurred and times of evacuation (UTC)

Country	Sea Level Station	Monitoring method
Australia	Cocos Island	Local network
	Christmas Island	Local network
	Padang	GLOSS
	Sibolga	GLOSS
	Cilicap	GLOSS
India	Indian Tsunami Buoy TB-10	other
	Indian Tsunami Buoy TB - 10 A	other
	Indian Tsunami Buoy TB - 3	other
	Indian Tsunami Buoy TB - 7	other
	Padang	GTS, other
	Cilicap	GTS, other
	Port Blair	GTS, other
	Chennai	GTS, other
Indonesia	Padang	GTS
	Sibolga	GTS
	Cilacap	GTS
	Rodrigues	GTS
Iran	Chabahar	other
	Jask	other
Kenya	Lamu (GLOSS)	ODINAFRICA, other
	KILFI (KMD)	other
Madagascar	Padang	ODINAFRICA
	Colombo	ODINAFRICA
Malaysia	PADANG (PADA	GTS, ODINAFRICA
	COLOMBO (COLO)	GTS, ODINAFRICA
	HANIMADHOO (HANI)	GTS, ODINAFRICA
	SIBOLGA (SIBO	GTS, ODINAFRICA
	RODRIGUEZ (RODR)	GTS, ODINAFRICA
Maldives	Rodrigues	ODINAFRICA
	Sibologa	ODINAFRICA
	Sabang	ODINAFRICA
	Salalah	ODINAFRICA
	Benoa, Colombo, Male, Gan	ODINAFRICA
Mauritius	Port Louis	other
	Rodrigues	other
Pakistan	Karachi	other
Seychelles	Panang	GTS, other
	Cocos Island	GTS, other
	Seychelles	GTS, other
Sri Lanka	Padang	ODINAFRICA, other
	Cocos Island	ODINAFRICA
	Christmas Island	ODINAFRICA
Thailand	DART 23401	GTS

Table 5.12 Sea level stations monitored by countries

6. Summary

The tsunami generated by the 8.4 magnitude earthquake off Bengkulu, Sumatra on 12th September 2007 presented an ideal opportunity to assess the performance of the IOTWS. This was the first time that an ocean-wide tsunami watch bulletin had been issued by the interim advisory service provided by PTWC and JMA, and most of the Indian Ocean member states took some form of action. The UNESCO IOC Secretariat for the ICG/IOTWS undertook a survey of member states' responses to the event in order to collect information that can be used in a post-event assessment.

This report has been prepared by the Secretariat based on responses to a questionnaire sent out to 25 of 28 member states to which 21 responses were received. Factual details of the earthquake event and the tsunami are presented and the results of the survey are listed in tables and displayed as timelines and maps.

The survey has produced many positive results indicating that progress has been made in the development of the IOTWS. Some gaps and weaknesses have also been identified, mainly at the downstream end of the system where procedures for national warning dissemination and issuing evacuation orders require more attention in some member states.

It is also apparent that the seismic and sea level networks were able to detect and locate the earthquake source and confirm that a tsunami had been generated. As the core seismic and coastal and deep sea level station networks expand, it is expected that the time and accuracy for both detection and confirmation will reduce further to within the targets set by the ICG.

It is beyond the scope of this report to conduct a detailed interpretation of the results, and the survey results have been presented so that individual member states and the ICG can draw conclusions from this exercise and decide on future action. However, some key positive and negative highlights can be noted:

Positive

- All (21 out of 21) NTWCs received watch bulletins from PTWC/JMA
- 15 NTWCs received watch bulletin via the GTS
- Many (12) NTWCs undertook their own earthquake analysis
- Most member states (19) took some action after receiving the PTWC/JMA bulletin
- Many (13) member states monitored sea level
  - 5 by he GTS
  - 5 by ODINAFRICA
  - 4 by other systems, but not GTS or ODINAFRICA
  - 4 by other systems as well as GTS or ODINAFRICA
- Some (8) member states used numerical models in their analysis
- Indonesia located the earthquake hypocentre and issued a warning within 5 minutes of the event

All of the above represent positive steps towards the implementation of the IOTWS and member states and the ICG should be encouraged to maintain their efforts to make further improvements to the system.

Negative

- Several member states experienced delays in receiving watch bulletins from PTWC/JMA
- Some member states experienced downstream communications problems
- Some member states issued warnings after other member states had cancelled their warnings, e.g., 2 member states in East Africa issued national warnings after it had been established by other countries that there was no significant tsunami risk.
- In some member states, evacuations were ordered when a closer analysis of the event may have indicated that the tsunami risk was low. The positive side of this is that it is good practice for the communities involved but the negative side is that it can build complacency.
- In some member states there was confusion over the need to evacuate and disconnection between national and local decision making
- Although many member states monitored sea level, several indicated that they did not know how to do this

Most of the above negative outcomes of the survey can be addressed both by the ICG and at the national level through increased training and regional cooperation. Post-event assessments can assist in this process by highlighting the strengths and weaknesses of the IOTWS at regional, national and local levels and by raising the awareness of how member states responded, both individually and collectively. The true value of such assessments is that it allows member states to share information and experiences for the mutual benefit of improving the IOTWS for all members. It is therefore recommended that the ICG/IOTWS formalize this process and agree to a format and procedure for conducting surveys after every significant event in the Indian Ocean.

7. References

NOAA / PMEL / Center for Tsunami Research. Tsunami Event - September 12, 2007 Indonesia. http://nctr.pmel.noaa.gov/sumatra20070912.html.

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Annex 1: PTWC and JMA Bulletins

TSUNAMI BULLETIN NUMBER 001
PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS
ISSUED AT 1124Z 12 SEP 2007

THIS BULLETIN IS FOR ALL AREAS OF THE INDIAN OCEAN.

... AN INDIAN-OCEAN-WIDE TSUNAMI WATCH IS IN EFFECT ...

A TSUNAMI WATCH IS IN EFFECT FOR

INDONESIA / AUSTRALIA / INDIA / SRI LANKA / THAILAND /
UNITED KINGDOM / MALDIVES / MYANMAR / MALAYSIA / BANGLADESH /
MAURITIUS / REUNION / SEYCHELLES / MADAGASCAR / SOMALIA / OMAN /
PAKISTAN / IRAN / YEMEN / COMORES / CROZET ISLANDS /
MOZAMBIQUE / KENYA / TANZANIA / KERGUELEN ISLANDS /
SOUTH AFRICA / SINGAPORE

THIS BULLETIN IS ISSUED AS ADVICE TO GOVERNMENT AGENCIES. ONLY NATIONAL AND LOCAL GOVERNMENT AGENCIES HAVE THE AUTHORITY TO MAKE DECISIONS REGARDING THE OFFICIAL STATE OF ALERT IN THEIR AREA AND ANY ACTIONS TO BE TAKEN IN RESPONSE.

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 1110Z 12 SEP 2007
COORDINATES - 4.5 SOUTH 101.3 EAST
LOCATION - SOUTHERN SUMATERA INDONESIA
MAGNITUDE - 7.9

EVALUATION

EARTHQUAKES OF THIS SIZE HAVE THE POTENTIAL TO GENERATE A WIDESPREAD DESTRUCTIVE TSUNAMI THAT CAN AFFECT COASTLINES ACROSS THE ENTIRE INDIAN OCEAN BASIN.

HOWEVER - IT IS NOT KNOWN THAT A TSUNAMI WAS GENERATED. THIS WATCH IS BASED ONLY ON THE EARTHQUAKE EVALUATION. AUTHORITIES IN THE REGION SHOULD TAKE APPROPRIATE ACTION IN RESPONSE TO THE POSSIBILITY OF A WIDESPREAD DESTRUCTIVE TSUNAMI.

DUE TO ONLY LIMITED SEA LEVEL DATA FROM THE REGION IT MAY NOT BE POSSIBLE FOR THIS CENTER TO RAPIDLY CONFIRM NOR EVALUATE THE STRENGTH OF A TSUNAMI IF ONE HAS BEEN GENERATED.

ESTIMATED INITIAL TSUNAMI WAVE ARRIVAL TIMES AT FORECAST POINTS WITHIN THE WARNING AND WATCH AREAS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER 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.

LOCATION	FORECAST POINT	COORDINATES	ARRIVAL TIME
INDONESIA	BENGKULU	3.9S 102.0E	1123Z 12 SEP
	SIBERUT	1.5S 98.7E	1203Z 12 SEP
	PADANG	0.9S 100.1E	1214Z 12 SEP
	BANDAR LAMPUNG	5.7S 105.3E	1242Z 12 SEP
	SIMEULUE	2.5N 96.0E	1243Z 12 SEP

	CILACAP	7.8S	108.9E	1307Z 12 SEP
	BANDA ACEH	5.5N	95.1E	1329Z 12 SEP
	BALI	8.7S	115.3E	1345Z 12 SEP
	KUPANG	10.0S	123.4E	1453Z 12 SEP
	BELAWAN	3.8N	99.0E	1703Z 12 SEP
AUSTRALIA	CHRISTMAS IS	10.4S	105.4E	1220Z 12 SEP
	COCOS ISLAND	12.1S	96.7E	1234Z 12 SEP
	NORTH WEST CAPE	21.5S	113.9E	1429Z 12 SEP
	CAPE INSPIRATIO	25.9S	113.0E	1526Z 12 SEP
	CAPE LEVEQUE	16.1S	122.6E	1542Z 12 SEP
	PERTH	32.0S	115.3E	1545Z 12 SEP
	AUGUSTA	34.3S	114.7E	1559Z 12 SEP
	GERALDTOWN	28.6S	114.3E	1603Z 12 SEP
	ESPERANCE	34.0S	121.8E	1726Z 12 SEP
	KINGSTON SOUTH	37.0S	139.4E	1906Z 12 SEP
	EUCLA MOTEL	31.8S	128.9E	1934Z 12 SEP
	DARWIN	12.1S	130.7E	1948Z 12 SEP
	HEARD ISLAND	54.0S	73.5E	1955Z 12 SEP
	HOBART	43.3S	147.6E	2015Z 12 SEP
INDIA	GREAT NICOBAR	7.1N	93.6E	1338Z 12 SEP
	LITTLE ANDAMAN	10.7N	92.3E	1421Z 12 SEP
	PORT BLAIR	12.0N	92.5E	1440Z 12 SEP
	NORTH ANDAMAN	13.3N	92.6E	1453Z 12 SEP
	CHENNAI	13.4N	80.4E	1540Z 12 SEP
	KAKINADA	17.2N	82.7E	1604Z 12 SEP
	TRIVANDRUM	8.3N	76.9E	1608Z 12 SEP
	BALESHWAR	21.6N	87.3E	1701Z 12 SEP
	MANGALORE	13.3N	74.4E	1732Z 12 SEP
	BOMBAY	18.8N	72.6E	2005Z 12 SEP
	GULF OF KUTCH	22.7N	68.9E	2019Z 12 SEP
SRI LANKA	DONDRA HEAD	5.8N	80.5E	1447Z 12 SEP
	TRINCOMALEE	8.7N	81.3E	1502Z 12 SEP
	COLOMBO	6.9N	79.8E	1515Z 12 SEP
	JAFFNA	9.9N	80.0E	1625Z 12 SEP
THAILAND	PHUKET	8.0N	98.2E	1508Z 12 SEP
	KO PHRA THONG	9.1N	98.2E	1554Z 12 SEP
	KO TARUTAO	6.6N	99.6E	1626Z 12 SEP
UNITED KINGDOM	DIEGO GARCIA	7.3S	72.4E	1526Z 12 SEP
MALDIVES	GAN	0.6S	73.2E	1528Z 12 SEP
	MALE	4.2N	73.6E	1544Z 12 SEP
	MINICOV	8.3N	73.0E	1614Z 12 SEP
MYANMAR	PYINKAYAING	15.8N	94.2E	1537Z 12 SEP
	CHEDUBA ISLAND	18.9N	93.4E	1554Z 12 SEP
	SITTWE	20.0N	92.9E	1629Z 12 SEP
	MERGUI	12.8N	98.4E	1647Z 12 SEP
	YANGON	16.2N	96.5E	1713Z 12 SEP
MALAYSIA	GEORGETOWN	5.4N	100.1E	1704Z 12 SEP
	PORT DICKSON	2.5N	101.7E	2048Z 12 SEP
BANGLADESH	CHITTAGONG	22.5N	91.2E	1801Z 12 SEP
MAURITIUS	PORT LOUIS	20.0S	57.3E	1803Z 12 SEP
REUNION	ST DENIS	20.8S	55.2E	1820Z 12 SEP
SEYCHELLES	VICTORIA	4.5S	55.6E	1847Z 12 SEP
MADAGASCAR	TOAMASINA	17.8S	49.8E	1900Z 12 SEP
	ANTSIRANANA	12.1S	49.5E	1905Z 12 SEP
	MANAKARA	22.2S	48.2E	1919Z 12 SEP
	CAP STE MARIE	25.8S	45.2E	2009Z 12 SEP
	MAHAJANGA	15.4S	46.2E	2009Z 12 SEP
	TOLIARA	23.4S	43.6E	2034Z 12 SEP
SOMALIA	HILALAYA	6.5N	49.2E	1922Z 12 SEP
	CAPE GUARO	11.9N	51.4E	1933Z 12 SEP
	MOGADISHU	2.0N	45.5E	1938Z 12 SEP

	KAAMBOONI	1.5S	41.9E	2004Z 12 SEP
OMAN	SALALAH	17.0N	54.2E	1930Z 12 SEP
	DUQM	19.7N	57.8E	1939Z 12 SEP
	MUSCAT	23.9N	58.6E	1943Z 12 SEP
PAKISTAN	GWADAR	25.1N	62.4E	1937Z 12 SEP
	KARACHI	24.7N	66.9E	2031Z 12 SEP
IRAN	GAVATER	25.0N	61.3E	1943Z 12 SEP
YEMEN	AL MUKALLA	14.5N	49.2E	2003Z 12 SEP
	ADEN	13.0N	45.2E	2100Z 12 SEP
COMORES	MORONI	11.6S	43.3E	2006Z 12 SEP
CROZET ISLANDS	CROZET ISLANDS	46.4S	51.8E	2009Z 12 SEP
MOZAMBIQUE	CABO DELGADO	10.7S	40.7E	2034Z 12 SEP
	ANGOCHE	15.5S	40.8E	2044Z 12 SEP
	QUELIMANE	18.0S	37.1E	2213Z 12 SEP
	MAPUTO	25.9S	32.8E	2218Z 12 SEP
	BEIRA	19.9S	35.1E	2246Z 12 SEP
KENYA	MOMBASA	4.0S	39.7E	2039Z 12 SEP
TANZANIA	LINDI	9.8S	39.9E	2039Z 12 SEP
	DAR ES SALAAM	6.7S	39.4E	2047Z 12 SEP
KERGUELEN ISLAN	PORT AUX FRANCA	49.0S	69.2E	2049Z 12 SEP
SOUTH AFRICA	PRINCE EDWARD I	46.6S	37.6E	2146Z 12 SEP
	DURBAN	29.8S	31.2E	2205Z 12 SEP
	PORT ELIZABETH	33.9S	25.8E	2256Z 12 SEP
	CAPE TOWN	34.1S	18.0E	2359Z 12 SEP
SINGAPORE	SINGAPORE	1.2N	103.8E	0048Z 13 SEP

THIS WILL BE THE ONLY BULLETIN ISSUED BY THE PACIFIC TSUNAMI
WARNING CENTER FOR THIS EVENT UNLESS ADDITIONAL INFORMATION
BECOMES AVAILABLE.

THE JAPAN METEOROLOGICAL AGENCY MAY ISSUE ADDITIONAL INFORMATION
FOR THIS EVENT. IN THE CASE OF CONFLICTING INFORMATION...THE
MORE CONSERVATIVE INFORMATION SHOULD BE USED FOR SAFETY.

TSUNAMI BULLETIN NUMBER 002
PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS
ISSUED AT 1153Z 12 SEP 2007

THIS BULLETIN IS FOR ALL AREAS OF THE INDIAN OCEAN.

... AN INDIAN-OCEAN-WIDE TSUNAMI WATCH IS IN EFFECT ...

NOTE REVISED MAGNITUDE

A TSUNAMI WATCH IS IN EFFECT FOR

INDONESIA / AUSTRALIA / INDIA / SRI LANKA / THAILAND /
UNITED KINGDOM / MALDIVES / MYANMAR / MALAYSIA / BANGLADESH /
MAURITIUS / REUNION / SEYCHELLES / MADAGASCAR / SOMALIA / OMAN /
PAKISTAN / IRAN / YEMEN / COMORES / CROZET ISLANDS /
MOZAMBIQUE / KENYA / TANZANIA / KERGUELEN ISLANDS /
SOUTH AFRICA / SINGAPORE

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AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 1110Z 12 SEP 2007
COORDINATES - 4.5 SOUTH 101.3 EAST
LOCATION - SOUTHERN SUMATERA INDONESIA
MAGNITUDE - 8.2

EVALUATION

EARTHQUAKES OF THIS SIZE HAVE THE POTENTIAL TO GENERATE A WIDESPREAD DESTRUCTIVE TSUNAMI THAT CAN AFFECT COASTLINES ACROSS THE ENTIRE INDIAN OCEAN BASIN.

HOWEVER - IT IS NOT KNOWN THAT A TSUNAMI WAS GENERATED. THIS WATCH IS BASED ONLY ON THE EARTHQUAKE EVALUATION. AUTHORITIES IN THE REGION SHOULD TAKE APPROPRIATE ACTION IN RESPONSE TO THE POSSIBILITY OF A WIDESPREAD DESTRUCTIVE TSUNAMI.

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ESTIMATED INITIAL TSUNAMI WAVE ARRIVAL TIMES AT FORECAST POINTS WITHIN THE WARNING AND WATCH AREAS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER 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.

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INDONESIA	BENGKULU	3.9S 102.0E	1123Z 12 SEP
	SIBERUT	1.5S 98.7E	1203Z 12 SEP
	PADANG	0.9S 100.1E	1214Z 12 SEP
	BANDAR LAMPUNG	5.7S 105.3E	1242Z 12 SEP
	SIMEULUE	2.5N 96.0E	1243Z 12 SEP
	CILACAP	7.8S 108.9E	1307Z 12 SEP
	BANDA ACEH	5.5N 95.1E	1329Z 12 SEP

	BALI	8.7S	115.3E	1345Z 12 SEP
	KUPANG	10.0S	123.4E	1453Z 12 SEP
	BELAWAN	3.8N	99.0E	1703Z 12 SEP
AUSTRALIA	CHRISTMAS IS	10.4S	105.4E	1220Z 12 SEP
	COCOS ISLAND	12.1S	96.7E	1234Z 12 SEP
	NORTH WEST CAPE	21.5S	113.9E	1429Z 12 SEP
	CAPE INSPIRATIO	25.9S	113.0E	1526Z 12 SEP
	CAPE LEVEQUE	16.1S	122.6E	1542Z 12 SEP
	PERTH	32.0S	115.3E	1545Z 12 SEP
	AUGUSTA	34.3S	114.7E	1559Z 12 SEP
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	EUCLA MOTEL	31.8S	128.9E	1934Z 12 SEP
	DARWIN	12.1S	130.7E	1948Z 12 SEP
	HEARD ISLAND	54.0S	73.5E	1955Z 12 SEP
	HOBART	43.3S	147.6E	2015Z 12 SEP
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	LITTLE ANDAMAN	10.7N	92.3E	1421Z 12 SEP
	PORT BLAIR	12.0N	92.5E	1440Z 12 SEP
	NORTH ANDAMAN	13.3N	92.6E	1453Z 12 SEP
	CHENNAI	13.4N	80.4E	1540Z 12 SEP
	KAKINADA	17.2N	82.7E	1604Z 12 SEP
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	MANGALORE	13.3N	74.4E	1732Z 12 SEP
	BOMBAY	18.8N	72.6E	2005Z 12 SEP
	GULF OF KUTCH	22.7N	68.9E	2019Z 12 SEP
SRI LANKA	DONDRA HEAD	5.8N	80.5E	1447Z 12 SEP
	TRINCOMALEE	8.7N	81.3E	1502Z 12 SEP
	COLOMBO	6.9N	79.8E	1515Z 12 SEP
	JAFFNA	9.9N	80.0E	1625Z 12 SEP
THAILAND	PHUKET	8.0N	98.2E	1508Z 12 SEP
	KO PHRA THONG	9.1N	98.2E	1554Z 12 SEP
	KO TARUTAO	6.6N	99.6E	1626Z 12 SEP
UNITED KINGDOM	DIEGO GARCIA	7.3S	72.4E	1526Z 12 SEP
MALDIVES	GAN	0.6S	73.2E	1528Z 12 SEP
	MALE	4.2N	73.6E	1544Z 12 SEP
	MINICOV	8.3N	73.0E	1614Z 12 SEP
MYANMAR	PYINKAYAING	15.8N	94.2E	1537Z 12 SEP
	CHEDUBA ISLAND	18.9N	93.4E	1554Z 12 SEP
	SITTWE	20.0N	92.9E	1629Z 12 SEP
	MERGUI	12.8N	98.4E	1647Z 12 SEP
	YANGON	16.2N	96.5E	1713Z 12 SEP
MALAYSIA	GEORGETOWN	5.4N	100.1E	1704Z 12 SEP
	PORT DICKSON	2.5N	101.7E	2048Z 12 SEP
BANGLADESH	CHITTAGONG	22.5N	91.2E	1801Z 12 SEP
MAURITIUS	PORT LOUIS	20.0S	57.3E	1803Z 12 SEP
REUNION	ST DENIS	20.8S	55.2E	1820Z 12 SEP
SEYCHELLES	VICTORIA	4.5S	55.6E	1847Z 12 SEP
MADAGASCAR	TOAMASINA	17.8S	49.8E	1900Z 12 SEP
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	MANAKARA	22.2S	48.2E	1919Z 12 SEP
	CAP STE MARIE	25.8S	45.2E	2009Z 12 SEP
	MAHAJANGA	15.4S	46.2E	2009Z 12 SEP
	TOLIARA	23.4S	43.6E	2034Z 12 SEP
SOMALIA	HILALAYA	6.5N	49.2E	1922Z 12 SEP
	CAPE GUARO	11.9N	51.4E	1933Z 12 SEP
	MOGADISHU	2.0N	45.5E	1938Z 12 SEP
	KAAMBOONI	1.5S	41.9E	2004Z 12 SEP
OMAN	SALALAH	17.0N	54.2E	1930Z 12 SEP

	DUQM	19.7N	57.8E	1939Z 12 SEP
	MUSCAT	23.9N	58.6E	1943Z 12 SEP
PAKISTAN	GWADAR	25.1N	62.4E	1937Z 12 SEP
	KARACHI	24.7N	66.9E	2031Z 12 SEP
IRAN	GAVATER	25.0N	61.3E	1943Z 12 SEP
YEMEN	AL MUKALLA	14.5N	49.2E	2003Z 12 SEP
	ADEN	13.0N	45.2E	2100Z 12 SEP
COMORES	MORONI	11.6S	43.3E	2006Z 12 SEP
CROZET ISLANDS	CROZET ISLANDS	46.4S	51.8E	2009Z 12 SEP
MOZAMBIQUE	CABO DELGADO	10.7S	40.7E	2034Z 12 SEP
	ANGOCHE	15.5S	40.8E	2044Z 12 SEP
	QUELIMANE	18.0S	37.1E	2213Z 12 SEP
	MAPUTO	25.9S	32.8E	2218Z 12 SEP
	BEIRA	19.9S	35.1E	2246Z 12 SEP
KENYA	MOMBASA	4.0S	39.7E	2039Z 12 SEP
TANZANIA	LINDI	9.8S	39.9E	2039Z 12 SEP
	DAR ES SALAAM	6.7S	39.4E	2047Z 12 SEP
KERGUELEN ISLAN	PORT AUX FRANCA	49.0S	69.2E	2049Z 12 SEP
SOUTH AFRICA	PRINCE EDWARD I	46.6S	37.6E	2146Z 12 SEP
	DURBAN	29.8S	31.2E	2205Z 12 SEP
	PORT ELIZABETH	33.9S	25.8E	2256Z 12 SEP
	CAPE TOWN	34.1S	18.0E	2359Z 12 SEP
SINGAPORE	SINGAPORE	1.2N	103.8E	0048Z 13 SEP

THIS WILL BE THE FINAL BULLETIN ISSUED BY THE PACIFIC TSUNAMI WARNING CENTER FOR THIS EVENT UNLESS ADDITIONAL INFORMATION BECOMES AVAILABLE.

THE JAPAN METEOROLOGICAL AGENCY MAY ISSUE ADDITIONAL INFORMATION FOR THIS EVENT. IN THE CASE OF CONFLICTING INFORMATION...THE MORE CONSERVATIVE INFORMATION SHOULD BE USED FOR SAFETY.

TSUNAMI BULLETIN NUMBER 003
PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS
ISSUED AT 1230Z 12 SEP 2007

THIS BULLETIN IS FOR ALL AREAS OF THE INDIAN OCEAN.

... AN INDIAN-OCEAN-WIDE TSUNAMI WATCH IS IN EFFECT ...

A TSUNAMI WATCH IS IN EFFECT FOR

INDONESIA / AUSTRALIA / INDIA / SRI LANKA / THAILAND /
UNITED KINGDOM / MALDIVES / MYANMAR / MALAYSIA / BANGLADESH /
MAURITIUS / REUNION / SEYCHELLES / MADAGASCAR / SOMALIA / OMAN /
PAKISTAN / IRAN / YEMEN / COMORES / CROZET ISLANDS /
MOZAMBIQUE / KENYA / TANZANIA / KERGUELEN ISLANDS /
SOUTH AFRICA / SINGAPORE

THIS BULLETIN IS ISSUED AS ADVICE TO GOVERNMENT AGENCIES. ONLY NATIONAL AND LOCAL GOVERNMENT AGENCIES HAVE THE AUTHORITY TO MAKE DECISIONS REGARDING THE OFFICIAL STATE OF ALERT IN THEIR AREA AND ANY ACTIONS TO BE TAKEN IN RESPONSE.

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 1110Z 12 SEP 2007
COORDINATES - 4.5 SOUTH 101.3 EAST
LOCATION - SOUTHERN SUMATERA INDONESIA
MAGNITUDE - 8.2

MEASUREMENTS OR REPORTS OF TSUNAMI WAVE ACTIVITY

GAUGE LOCATION	LAT	LON	TIME	AMPL	PER
PADANG ID	0.9S	100.4E	1221Z	0.35M / 1.2FT	28MIN

LAT - LATITUDE (N-NORTH, S-SOUTH)
LON - LONGITUDE (E-EAST, W-WEST)
TIME - TIME OF THE MEASUREMENT (Z IS UTC IS GREENWICH TIME)
AMPL - TSUNAMI AMPLITUDE MEASURED RELATIVE TO NORMAL SEA LEVEL.
IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT.
VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT).
PER - PERIOD OF TIME IN MINUTES(MIN) FROM ONE WAVE TO THE NEXT.

EVALUATION

SEA LEVEL READINGS INDICATE A TSUNAMI WAS GENERATED. IT MAY ALREADY HAVE BEEN DESTRUCTIVE ALONG SOME COASTS.

BASED ON THESE DATA THE THREAT CONTINUES FOR ALL COASTAL AREAS OF THE INDIAN OCEAN. FOR THOSE AREAS - WHEN NO MAJOR WAVES HAVE OCCURRED FOR AT LEAST TWO HOURS AFTER THE ESTIMATED ARRIVAL TIME OR DAMAGING WAVES HAVE NOT OCCURRED FOR AT LEAST TWO HOURS THEN LOCAL AUTHORITIES CAN ASSUME THE THREAT IS PASSED. DANGER TO BOATS AND COASTAL STRUCTURES CAN CONTINUE FOR SEVERAL HOURS DUE TO RAPID CURRENTS. AS LOCAL CONDITIONS CAN CAUSE A WIDE VARIATION IN TSUNAMI WAVE ACTION THE ALL CLEAR DETERMINATION MUST BE MADE BY LOCAL AUTHORITIES.

DUE TO ONLY LIMITED SEA LEVEL DATA FROM THE REGION IT MAY NOT BE POSSIBLE FOR THIS CENTER TO RAPIDLY NOR ACCURATELY EVALUATE THE STRENGTH OF A TSUNAMI IF ONE HAS BEEN GENERATED.

ESTIMATED INITIAL TSUNAMI WAVE ARRIVAL TIMES AT FORECAST POINTS WITHIN THE WARNING AND WATCH AREAS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER 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.

LOCATION	FORECAST POINT	COORDINATES	ARRIVAL TIME
INDONESIA	BENGKULU	3.9S 102.0E	1123Z 12 SEP
	SIBERUT	1.5S 98.7E	1203Z 12 SEP
	PADANG	0.9S 100.1E	1214Z 12 SEP
	BANDAR LAMPUNG	5.7S 105.3E	1242Z 12 SEP
	SIMEULUE	2.5N 96.0E	1243Z 12 SEP
	CILACAP	7.8S 108.9E	1307Z 12 SEP
	BANDA ACEH	5.5N 95.1E	1329Z 12 SEP
	BALI	8.7S 115.3E	1345Z 12 SEP
	KUPANG	10.0S 123.4E	1453Z 12 SEP
	BELAWAN	3.8N 99.0E	1703Z 12 SEP
AUSTRALIA	CHRISTMAS IS	10.4S 105.4E	1220Z 12 SEP
	COCOS ISLAND	12.1S 96.7E	1234Z 12 SEP
	NORTH WEST CAPE	21.5S 113.9E	1429Z 12 SEP
	CAPE INSPIRATIO	25.9S 113.0E	1526Z 12 SEP
	CAPE LEVEQUE	16.1S 122.6E	1542Z 12 SEP
	PERTH	32.0S 115.3E	1545Z 12 SEP
	AUGUSTA	34.3S 114.7E	1559Z 12 SEP
	GERALDTOWN	28.6S 114.3E	1603Z 12 SEP
	ESPERANCE	34.0S 121.8E	1726Z 12 SEP
	KINGSTON SOUTH	37.0S 139.4E	1906Z 12 SEP
	EUCLA MOTEL	31.8S 128.9E	1934Z 12 SEP
	DARWIN	12.1S 130.7E	1948Z 12 SEP
	HEARD ISLAND	54.0S 73.5E	1955Z 12 SEP
	HOBART	43.3S 147.6E	2015Z 12 SEP
INDIA	GREAT NICOBAR	7.1N 93.6E	1338Z 12 SEP
	LITTLE ANDAMAN	10.7N 92.3E	1421Z 12 SEP
	PORT BLAIR	12.0N 92.5E	1440Z 12 SEP
	NORTH ANDAMAN	13.3N 92.6E	1453Z 12 SEP
	CHENNAI	13.4N 80.4E	1540Z 12 SEP
	KAKINADA	17.2N 82.7E	1604Z 12 SEP
	TRIVANDRUM	8.3N 76.9E	1608Z 12 SEP
	BALESHWAR	21.6N 87.3E	1701Z 12 SEP
	MANGALORE	13.3N 74.4E	1732Z 12 SEP
	BOMBAY	18.8N 72.6E	2005Z 12 SEP
	GULF OF KUTCH	22.7N 68.9E	2019Z 12 SEP
SRI LANKA	DONDRA HEAD	5.8N 80.5E	1447Z 12 SEP
	TRINCOMALEE	8.7N 81.3E	1502Z 12 SEP
	COLOMBO	6.9N 79.8E	1515Z 12 SEP
	JAFFNA	9.9N 80.0E	1625Z 12 SEP
THAILAND	PHUKET	8.0N 98.2E	1508Z 12 SEP
	KO PHRA THONG	9.1N 98.2E	1554Z 12 SEP
	KO TARUTAO	6.6N 99.6E	1626Z 12 SEP
UNITED KINGDOM	DIEGO GARCIA	7.3S 72.4E	1526Z 12 SEP
MALDIVES	GAN	0.6S 73.2E	1528Z 12 SEP
	MALE	4.2N 73.6E	1544Z 12 SEP
	MINICOV	8.3N 73.0E	1614Z 12 SEP
MYANMAR	PYINKAYAING	15.8N 94.2E	1537Z 12 SEP
	CHEDUBA ISLAND	18.9N 93.4E	1554Z 12 SEP
	SITTWE	20.0N 92.9E	1629Z 12 SEP
	MERGUI	12.8N 98.4E	1647Z 12 SEP
	YANGON	16.2N 96.5E	1713Z 12 SEP
MALAYSIA	GEORGETOWN	5.4N 100.1E	1704Z 12 SEP

	PORT DICKSON	2.5N	101.7E	2048Z 12 SEP
BANGLADESH	CHITTAGONG	22.5N	91.2E	1801Z 12 SEP
MAURITIUS	PORT LOUIS	20.0S	57.3E	1803Z 12 SEP
REUNION	ST DENIS	20.8S	55.2E	1820Z 12 SEP
SEYCHELLES	VICTORIA	4.5S	55.6E	1847Z 12 SEP
MADAGASCAR	TOAMASINA	17.8S	49.8E	1900Z 12 SEP
	ANTSIRANANA	12.1S	49.5E	1905Z 12 SEP
	MANAKARA	22.2S	48.2E	1919Z 12 SEP
	CAP STE MARIE	25.8S	45.2E	2009Z 12 SEP
	MAHAJANGA	15.4S	46.2E	2009Z 12 SEP
	TOLIARA	23.4S	43.6E	2034Z 12 SEP
SOMALIA	HILALAYA	6.5N	49.2E	1922Z 12 SEP
	CAPE GUARO	11.9N	51.4E	1933Z 12 SEP
	MOGADISHU	2.0N	45.5E	1938Z 12 SEP
	KAAMBOONI	1.5S	41.9E	2004Z 12 SEP
OMAN	SALALAH	17.0N	54.2E	1930Z 12 SEP
	DUQM	19.7N	57.8E	1939Z 12 SEP
	MUSCAT	23.9N	58.6E	1943Z 12 SEP
PAKISTAN	GWADAR	25.1N	62.4E	1937Z 12 SEP
	KARACHI	24.7N	66.9E	2031Z 12 SEP
IRAN	GAVATER	25.0N	61.3E	1943Z 12 SEP
YEMEN	AL MUKALLA	14.5N	49.2E	2003Z 12 SEP
	ADEN	13.0N	45.2E	2100Z 12 SEP
COMORES	MORONI	11.6S	43.3E	2006Z 12 SEP
CROZET ISLANDS	CROZET ISLANDS	46.4S	51.8E	2009Z 12 SEP
MOZAMBIQUE	CABO DELGADO	10.7S	40.7E	2034Z 12 SEP
	ANGOCHE	15.5S	40.8E	2044Z 12 SEP
	QUELIMANE	18.0S	37.1E	2213Z 12 SEP
	MAPUTO	25.9S	32.8E	2218Z 12 SEP
	BEIRA	19.9S	35.1E	2246Z 12 SEP
KENYA	MOMBASA	4.0S	39.7E	2039Z 12 SEP
TANZANIA	LINDI	9.8S	39.9E	2039Z 12 SEP
	DAR ES SALAAM	6.7S	39.4E	2047Z 12 SEP
KERGUELEN ISLAN	PORT AUX FRANCA	49.0S	69.2E	2049Z 12 SEP
SOUTH AFRICA	PRINCE EDWARD I	46.6S	37.6E	2146Z 12 SEP
	DURBAN	29.8S	31.2E	2205Z 12 SEP
	PORT ELIZABETH	33.9S	25.8E	2256Z 12 SEP
	CAPE TOWN	34.1S	18.0E	2359Z 12 SEP
SINGAPORE	SINGAPORE	1.2N	103.8E	0048Z 13 SEP

THE JAPAN METEOROLOGICAL AGENCY MAY ISSUE ADDITIONAL INFORMATION
FOR THIS EVENT. IN THE CASE OF CONFLICTING INFORMATION...THE
MORE CONSERVATIVE INFORMATION SHOULD BE USED FOR SAFETY.

TSUNAMI BULLETIN NUMBER 004
PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS
ISSUED AT 1321Z 12 SEP 2007

THIS BULLETIN IS FOR ALL AREAS OF THE INDIAN OCEAN.

... AN INDIAN-OCEAN-WIDE TSUNAMI WATCH IS IN EFFECT ...

A TSUNAMI WATCH IS IN EFFECT FOR

INDONESIA / AUSTRALIA / INDIA / SRI LANKA / THAILAND /
UNITED KINGDOM / MALDIVES / MYANMAR / MALAYSIA / BANGLADESH /
MAURITIUS / REUNION / SEYCHELLES / MADAGASCAR / SOMALIA / OMAN /
PAKISTAN / IRAN / YEMEN / COMORES / CROZET ISLANDS /
MOZAMBIQUE / KENYA / TANZANIA / KERGUELEN ISLANDS /
SOUTH AFRICA / SINGAPORE

THIS BULLETIN IS ISSUED AS ADVICE TO GOVERNMENT AGENCIES. ONLY NATIONAL AND LOCAL GOVERNMENT AGENCIES HAVE THE AUTHORITY TO MAKE DECISIONS REGARDING THE OFFICIAL STATE OF ALERT IN THEIR AREA AND ANY ACTIONS TO BE TAKEN IN RESPONSE.

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 1110Z 12 SEP 2007
COORDINATES - 4.5 SOUTH 101.3 EAST
LOCATION - SOUTHERN SUMATERA INDONESIA
MAGNITUDE - 8.2

MEASUREMENTS OR REPORTS OF TSUNAMI WAVE ACTIVITY

GAUGE LOCATION	LAT	LON	TIME	AMPL	PER
PADANG ID	0.9S	100.4E	1306Z	0.56M / 1.8FT	34MIN
COCOS CC	12.1S	96.9E	1236Z	0.11M / 0.4FT	22MIN

LAT - LATITUDE (N-NORTH, S-SOUTH)
LON - LONGITUDE (E-EAST, W-WEST)
TIME - TIME OF THE MEASUREMENT (Z IS UTC IS GREENWICH TIME)
AMPL - TSUNAMI AMPLITUDE MEASURED RELATIVE TO NORMAL SEA LEVEL.
IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT.
VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT).
PER - PERIOD OF TIME IN MINUTES(MIN) FROM ONE WAVE TO THE NEXT.

EVALUATION

SEA LEVEL READINGS INDICATE A TSUNAMI WAS GENERATED. IT MAY ALREADY HAVE BEEN DESTRUCTIVE ALONG SOME COASTS.

BASED ON THESE DATA THE THREAT CONTINUES FOR ALL COASTAL AREAS OF THE INDIAN OCEAN. FOR THOSE AREAS - WHEN NO MAJOR WAVES HAVE OCCURRED FOR AT LEAST TWO HOURS AFTER THE ESTIMATED ARRIVAL TIME OR DAMAGING WAVES HAVE NOT OCCURRED FOR AT LEAST TWO HOURS THEN LOCAL AUTHORITIES CAN ASSUME THE THREAT IS PASSED. DANGER TO BOATS AND COASTAL STRUCTURES CAN CONTINUE FOR SEVERAL HOURS DUE TO RAPID CURRENTS. AS LOCAL CONDITIONS CAN CAUSE A WIDE VARIATION IN TSUNAMI WAVE ACTION THE ALL CLEAR DETERMINATION MUST BE MADE BY LOCAL AUTHORITIES.

DUE TO ONLY LIMITED SEA LEVEL DATA FROM THE REGION IT MAY NOT BE POSSIBLE FOR THIS CENTER TO RAPIDLY NOR ACCURATELY EVALUATE

THE STRENGTH OF A TSUNAMI IF ONE HAS BEEN GENERATED.

ESTIMATED INITIAL TSUNAMI WAVE ARRIVAL TIMES AT FORECAST POINTS WITHIN THE WARNING AND WATCH AREAS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER 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.

LOCATION	FORECAST POINT	COORDINATES	ARRIVAL TIME
INDONESIA	BENGKULU	3.9S 102.0E	1123Z 12 SEP
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	PADANG	0.9S 100.1E	1214Z 12 SEP
	BANDAR LAMPUNG	5.7S 105.3E	1242Z 12 SEP
	SIMEULUE	2.5N 96.0E	1243Z 12 SEP
	CILACAP	7.8S 108.9E	1307Z 12 SEP
	BANDA ACEH	5.5N 95.1E	1329Z 12 SEP
	BALI	8.7S 115.3E	1345Z 12 SEP
	KUPANG	10.0S 123.4E	1453Z 12 SEP
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AUSTRALIA	CHRISTMAS IS	10.4S 105.4E	1220Z 12 SEP
	COCOS ISLAND	12.1S 96.7E	1234Z 12 SEP
	NORTH WEST CAPE	21.5S 113.9E	1429Z 12 SEP
	CAPE INSPIRATIO	25.9S 113.0E	1526Z 12 SEP
	CAPE LEVEQUE	16.1S 122.6E	1542Z 12 SEP
	PERTH	32.0S 115.3E	1545Z 12 SEP
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	GERALDTOWN	28.6S 114.3E	1603Z 12 SEP
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	KINGSTON SOUTH	37.0S 139.4E	1906Z 12 SEP
	EUCLA MOTEL	31.8S 128.9E	1934Z 12 SEP
	DARWIN	12.1S 130.7E	1948Z 12 SEP
	HEARD ISLAND	54.0S 73.5E	1955Z 12 SEP
	HOBART	43.3S 147.6E	2015Z 12 SEP
INDIA	GREAT NICOBAR	7.1N 93.6E	1338Z 12 SEP
	LITTLE ANDAMAN	10.7N 92.3E	1421Z 12 SEP
	PORT BLAIR	12.0N 92.5E	1440Z 12 SEP
	NORTH ANDAMAN	13.3N 92.6E	1453Z 12 SEP
	CHENNAI	13.4N 80.4E	1540Z 12 SEP
	KAKINADA	17.2N 82.7E	1604Z 12 SEP
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	MANGALORE	13.3N 74.4E	1732Z 12 SEP
	BOMBAY	18.8N 72.6E	2005Z 12 SEP
	GULF OF KUTCH	22.7N 68.9E	2019Z 12 SEP
SRI LANKA	DONDRA HEAD	5.8N 80.5E	1447Z 12 SEP
	TRINCOMALEE	8.7N 81.3E	1502Z 12 SEP
	COLOMBO	6.9N 79.8E	1515Z 12 SEP
	JAFFNA	9.9N 80.0E	1625Z 12 SEP
THAILAND	PHUKET	8.0N 98.2E	1508Z 12 SEP
	KO PHRA THONG	9.1N 98.2E	1554Z 12 SEP
	KO TARUTAO	6.6N 99.6E	1626Z 12 SEP
UNITED KINGDOM	DIEGO GARCIA	7.3S 72.4E	1526Z 12 SEP
MALDIVES	GAN	0.6S 73.2E	1528Z 12 SEP
	MALE	4.2N 73.6E	1544Z 12 SEP
	MINICOV	8.3N 73.0E	1614Z 12 SEP
MYANMAR	PYINKAYAING	15.8N 94.2E	1537Z 12 SEP
	CHEDUBA ISLAND	18.9N 93.4E	1554Z 12 SEP
	SITTWE	20.0N 92.9E	1629Z 12 SEP
	MERGUI	12.8N 98.4E	1647Z 12 SEP
	YANGON	16.2N 96.5E	1713Z 12 SEP

MALAYSIA	GEORGETOWN	5.4N	100.1E	1704Z 12 SEP
	PORT DICKSON	2.5N	101.7E	2048Z 12 SEP
BANGLADESH	CHITTAGONG	22.5N	91.2E	1801Z 12 SEP
MAURITIUS	PORT LOUIS	20.0S	57.3E	1803Z 12 SEP
REUNION	ST DENIS	20.8S	55.2E	1820Z 12 SEP
SEYCHELLES	VICTORIA	4.5S	55.6E	1847Z 12 SEP
MADAGASCAR	TOAMASINA	17.8S	49.8E	1900Z 12 SEP
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	MANAKARA	22.2S	48.2E	1919Z 12 SEP
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	MAHAJANGA	15.4S	46.2E	2009Z 12 SEP
	TOLIARA	23.4S	43.6E	2034Z 12 SEP
SOMALIA	HILALAYA	6.5N	49.2E	1922Z 12 SEP
	CAPE GUARO	11.9N	51.4E	1933Z 12 SEP
	MOGADISHU	2.0N	45.5E	1938Z 12 SEP
	KAAMBOONI	1.5S	41.9E	2004Z 12 SEP
OMAN	SALALAH	17.0N	54.2E	1930Z 12 SEP
	DUQM	19.7N	57.8E	1939Z 12 SEP
	MUSCAT	23.9N	58.6E	1943Z 12 SEP
PAKISTAN	GWADAR	25.1N	62.4E	1937Z 12 SEP
	KARACHI	24.7N	66.9E	2031Z 12 SEP
IRAN	GAVATER	25.0N	61.3E	1943Z 12 SEP
YEMEN	AL MUKALLA	14.5N	49.2E	2003Z 12 SEP
	ADEN	13.0N	45.2E	2100Z 12 SEP
COMORES	MORONI	11.6S	43.3E	2006Z 12 SEP
CROZET ISLANDS	CROZET ISLANDS	46.4S	51.8E	2009Z 12 SEP
MOZAMBIQUE	CABO DELGADO	10.7S	40.7E	2034Z 12 SEP
	ANGOCHE	15.5S	40.8E	2044Z 12 SEP
	QUELIMANE	18.0S	37.1E	2213Z 12 SEP
	MAPUTO	25.9S	32.8E	2218Z 12 SEP
	BEIRA	19.9S	35.1E	2246Z 12 SEP
KENYA	MOMBASA	4.0S	39.7E	2039Z 12 SEP
TANZANIA	LINDI	9.8S	39.9E	2039Z 12 SEP
	DAR ES SALAAM	6.7S	39.4E	2047Z 12 SEP
KERGUELEN ISLAN	PORT AUX FRANCA	49.0S	69.2E	2049Z 12 SEP
SOUTH AFRICA	PRINCE EDWARD I	46.6S	37.6E	2146Z 12 SEP
	DURBAN	29.8S	31.2E	2205Z 12 SEP
	PORT ELIZABETH	33.9S	25.8E	2256Z 12 SEP
	CAPE TOWN	34.1S	18.0E	2359Z 12 SEP
SINGAPORE	SINGAPORE	1.2N	103.8E	0048Z 13 SEP

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FOR THIS EVENT. IN THE CASE OF CONFLICTING INFORMATION...THE
MORE CONSERVATIVE INFORMATION SHOULD BE USED FOR SAFETY.

TSUNAMI BULLETIN NUMBER 005
PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS
ISSUED AT 1440Z 12 SEP 2007

THIS BULLETIN IS FOR ALL AREAS OF THE INDIAN OCEAN.

... AN INDIAN-OCEAN-WIDE TSUNAMI WATCH IS IN EFFECT ...

A TSUNAMI WATCH IS IN EFFECT FOR

INDONESIA / AUSTRALIA / INDIA / SRI LANKA / THAILAND /
UNITED KINGDOM / MALDIVES / MYANMAR / MALAYSIA / BANGLADESH /
MAURITIUS / REUNION / SEYCHELLES / MADAGASCAR / SOMALIA / OMAN /
PAKISTAN / IRAN / YEMEN / COMORES / CROZET ISLANDS /
MOZAMBIQUE / KENYA / TANZANIA / KERGUELEN ISLANDS /
SOUTH AFRICA / SINGAPORE

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AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 1110Z 12 SEP 2007
COORDINATES - 4.5 SOUTH 101.3 EAST
LOCATION - SOUTHERN SUMATERA INDONESIA
MAGNITUDE - 8.2

MEASUREMENTS OR REPORTS OF TSUNAMI WAVE ACTIVITY

GAUGE LOCATION	LAT	LON	TIME	AMPL	PER
PADANG ID	0.9S	100.4E	1348Z	0.98M / 3.2FT	34MIN
COCOS CC	12.1S	96.9E	1236Z	0.11M / 0.4FT	22MIN
DART 23401	8.9N	88.5E	1421Z	0.02M / 0.1FT	30MIN

LAT - LATITUDE (N-NORTH, S-SOUTH)
LON - LONGITUDE (E-EAST, W-WEST)
TIME - TIME OF THE MEASUREMENT (Z IS UTC IS GREENWICH TIME)
AMPL - TSUNAMI AMPLITUDE MEASURED RELATIVE TO NORMAL SEA LEVEL.
IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT.
VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT).
PER - PERIOD OF TIME IN MINUTES(MIN) FROM ONE WAVE TO THE NEXT.

EVALUATION

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	SIMEULUE	2.5N 96.0E	1243Z 12 SEP
	CILACAP	7.8S 108.9E	1307Z 12 SEP
	BANDA ACEH	5.5N 95.1E	1329Z 12 SEP
	BALI	8.7S 115.3E	1345Z 12 SEP
	KUPANG	10.0S 123.4E	1453Z 12 SEP
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	PORT BLAIR	12.0N 92.5E	1440Z 12 SEP
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	GULF OF KUTCH	22.7N 68.9E	2019Z 12 SEP
SRI LANKA	DONDRA HEAD	5.8N 80.5E	1447Z 12 SEP
	TRINCOMALEE	8.7N 81.3E	1502Z 12 SEP
	COLOMBO	6.9N 79.8E	1515Z 12 SEP
	JAFFNA	9.9N 80.0E	1625Z 12 SEP
THAILAND	PHUKET	8.0N 98.2E	1508Z 12 SEP
	KO PHRA THONG	9.1N 98.2E	1554Z 12 SEP
	KO TARUTAO	6.6N 99.6E	1626Z 12 SEP
UNITED KINGDOM	DIEGO GARCIA	7.3S 72.4E	1526Z 12 SEP
MALDIVES	GAN	0.6S 73.2E	1528Z 12 SEP
	MALE	4.2N 73.6E	1544Z 12 SEP
	MINICOV	8.3N 73.0E	1614Z 12 SEP
MYANMAR	PYINKAYAING	15.8N 94.2E	1537Z 12 SEP
	CHEDUBA ISLAND	18.9N 93.4E	1554Z 12 SEP
	SITTWE	20.0N 92.9E	1629Z 12 SEP
	MERGUI	12.8N 98.4E	1647Z 12 SEP
	YANGON	16.2N 96.5E	1713Z 12 SEP

MALAYSIA	GEORGETOWN	5.4N	100.1E	1704Z 12 SEP
	PORT DICKSON	2.5N	101.7E	2048Z 12 SEP
BANGLADESH	CHITTAGONG	22.5N	91.2E	1801Z 12 SEP
MAURITIUS	PORT LOUIS	20.0S	57.3E	1803Z 12 SEP
REUNION	ST DENIS	20.8S	55.2E	1820Z 12 SEP
SEYCHELLES	VICTORIA	4.5S	55.6E	1847Z 12 SEP
MADAGASCAR	TOAMASINA	17.8S	49.8E	1900Z 12 SEP
	ANTSIRANANA	12.1S	49.5E	1905Z 12 SEP
	MANAKARA	22.2S	48.2E	1919Z 12 SEP
	CAP STE MARIE	25.8S	45.2E	2009Z 12 SEP
	MAHAJANGA	15.4S	46.2E	2009Z 12 SEP
	TOLIARA	23.4S	43.6E	2034Z 12 SEP
SOMALIA	HILALAYA	6.5N	49.2E	1922Z 12 SEP
	CAPE GUARO	11.9N	51.4E	1933Z 12 SEP
	MOGADISHU	2.0N	45.5E	1938Z 12 SEP
	KAAMBOONI	1.5S	41.9E	2004Z 12 SEP
OMAN	SALALAH	17.0N	54.2E	1930Z 12 SEP
	DUQM	19.7N	57.8E	1939Z 12 SEP
	MUSCAT	23.9N	58.6E	1943Z 12 SEP
PAKISTAN	GWADAR	25.1N	62.4E	1937Z 12 SEP
	KARACHI	24.7N	66.9E	2031Z 12 SEP
IRAN	GAVATER	25.0N	61.3E	1943Z 12 SEP
YEMEN	AL MUKALLA	14.5N	49.2E	2003Z 12 SEP
	ADEN	13.0N	45.2E	2100Z 12 SEP
COMORES	MORONI	11.6S	43.3E	2006Z 12 SEP
CROZET ISLANDS	CROZET ISLANDS	46.4S	51.8E	2009Z 12 SEP
MOZAMBIQUE	CABO DELGADO	10.7S	40.7E	2034Z 12 SEP
	ANGOCHE	15.5S	40.8E	2044Z 12 SEP
	QUELIMANE	18.0S	37.1E	2213Z 12 SEP
	MAPUTO	25.9S	32.8E	2218Z 12 SEP
	BEIRA	19.9S	35.1E	2246Z 12 SEP
KENYA	MOMBASA	4.0S	39.7E	2039Z 12 SEP
TANZANIA	LINDI	9.8S	39.9E	2039Z 12 SEP
	DAR ES SALAAM	6.7S	39.4E	2047Z 12 SEP
KERGUELEN ISLAN	PORT AUX FRANCA	49.0S	69.2E	2049Z 12 SEP
SOUTH AFRICA	PRINCE EDWARD I	46.6S	37.6E	2146Z 12 SEP
	DURBAN	29.8S	31.2E	2205Z 12 SEP
	PORT ELIZABETH	33.9S	25.8E	2256Z 12 SEP
	CAPE TOWN	34.1S	18.0E	2359Z 12 SEP
SINGAPORE	SINGAPORE	1.2N	103.8E	0048Z 13 SEP

THE JAPAN METEOROLOGICAL AGENCY MAY ISSUE ADDITIONAL INFORMATION
FOR THIS EVENT. IN THE CASE OF CONFLICTING INFORMATION...THE
MORE CONSERVATIVE INFORMATION SHOULD BE USED FOR SAFETY.

TSUNAMI BULLETIN NUMBER 005
PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS
ISSUED AT 1505Z 12 SEP 2007

THIS BULLETIN IS FOR ALL AREAS OF THE INDIAN OCEAN.

... FINAL INDIAN-OCEAN-WIDE TSUNAMI WATCH ...

THIS THE FINAL TSUNAMI WATCH FOR

INDONESIA / AUSTRALIA / INDIA / SRI LANKA / THAILAND /
UNITED KINGDOM / MALDIVES / MYANMAR / MALAYSIA / BANGLADESH /
MAURITIUS / REUNION / SEYCHELLES / MADAGASCAR / SOMALIA / OMAN /
PAKISTAN / IRAN / YEMEN / COMORES / CROZET ISLANDS /
MOZAMBIQUE / KENYA / TANZANIA / KERGUELEN ISLANDS /
SOUTH AFRICA / SINGAPORE

THIS BULLETIN IS ISSUED AS ADVICE TO GOVERNMENT AGENCIES. ONLY
NATIONAL AND LOCAL GOVERNMENT AGENCIES HAVE THE AUTHORITY TO MAKE
DECISIONS REGARDING THE OFFICIAL STATE OF ALERT IN THEIR AREA AND
ANY ACTIONS TO BE TAKEN IN RESPONSE.

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 1110Z 12 SEP 2007
COORDINATES - 4.5 SOUTH 101.3 EAST
LOCATION - SOUTHERN SUMATERA INDONESIA
MAGNITUDE - 8.2

MEASUREMENTS OR REPORTS OF TSUNAMI WAVE ACTIVITY

GAUGE LOCATION	LAT	LON	TIME	AMPL	PER
SIBOLGA ID	1.7N	98.8E	1434Z	0.09M / 0.3FT	52MIN
PADANG ID	0.9S	100.4E	1348Z	0.98M / 3.2FT	34MIN
COCOS CC	12.1S	96.9E	1236Z	0.11M / 0.4FT	22MIN
DART 23401	8.9S	88.5E	1421Z	0.02M / 0.1FT	15MIN

LAT - LATITUDE (N-NORTH, S-SOUTH)
LON - LONGITUDE (E-EAST, W-WEST)
TIME - TIME OF THE MEASUREMENT (Z IS UTC IS GREENWICH TIME)
AMPL - TSUNAMI AMPLITUDE MEASURED RELATIVE TO NORMAL SEA LEVEL.
IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT.
VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT).
PER - PERIOD OF TIME IN MINUTES(MIN) FROM ONE WAVE TO THE NEXT.

EVALUATION

SEA LEVEL READINGS INDICATE A TSUNAMI WAS GENERATED. IT MAY HAVE
BEEN DESTRUCTIVE ALONG COASTS NEAR THE EARTHQUAKE EPICENTER.

FOR THOSE AREAS - WHEN NO MAJOR WAVES HAVE OCCURRED FOR AT LEAST
TWO HOURS AFTER THE ESTIMATED ARRIVAL TIME OR DAMAGING WAVES HAVE
NOT OCCURRED FOR AT LEAST TWO HOURS THEN LOCAL AUTHORITIES CAN
ASSUME THE THREAT IS PASSED. DANGER TO BOATS AND COASTAL
STRUCTURES CAN CONTINUE FOR SEVERAL HOURS DUE TO RAPID CURRENTS.
AS LOCAL CONDITIONS CAN CAUSE A WIDE VARIATION IN TSUNAMI WAVE
ACTION THE ALL CLEAR DETERMINATION MUST BE MADE BY LOCAL
AUTHORITIES.

BASED ON AVAILABLE DATA THIS CENTER DOES NOT EXPECT MORE WIDESPREAD
DESTRUCTIVE EFFECT. HOWEVER ...

DUE TO ONLY LIMITED SEA LEVEL DATA FROM THE REGION IT MAY NOT
BE POSSIBLE FOR THIS CENTER TO RAPIDLY NOR ACCURATELY EVALUATE
THE STRENGTH OF A TSUNAMI IF ONE HAS BEEN GENERATED.

ESTIMATED INITIAL TSUNAMI WAVE ARRIVAL TIMES AT FORECAST POINTS
WITHIN THE WARNING AND WATCH AREAS ARE GIVEN BELOW. ACTUAL
ARRIVAL TIMES MAY DIFFER 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.

LOCATION	FORECAST POINT	COORDINATES	ARRIVAL TIME
INDONESIA	BENGKULU	3.9S 102.0E	1123Z 12 SEP
	SIBERUT	1.5S 98.7E	1203Z 12 SEP
	PADANG	0.9S 100.1E	1214Z 12 SEP
	BANDAR LAMPUNG	5.7S 105.3E	1242Z 12 SEP
	SIMEULUE	2.5N 96.0E	1243Z 12 SEP
	CILACAP	7.8S 108.9E	1307Z 12 SEP
	BANDA ACEH	5.5N 95.1E	1329Z 12 SEP
	BALI	8.7S 115.3E	1345Z 12 SEP
	KUPANG	10.0S 123.4E	1453Z 12 SEP
	BELAWAN	3.8N 99.0E	1703Z 12 SEP
AUSTRALIA	CHRISTMAS IS	10.4S 105.4E	1220Z 12 SEP
	COCOS ISLAND	12.1S 96.7E	1234Z 12 SEP
	NORTH WEST CAPE	21.5S 113.9E	1429Z 12 SEP
	CAPE INSPIRATIO	25.9S 113.0E	1526Z 12 SEP
	CAPE LEVEQUE	16.1S 122.6E	1542Z 12 SEP
	PERTH	32.0S 115.3E	1545Z 12 SEP
	AUGUSTA	34.3S 114.7E	1559Z 12 SEP
	GERALDTOWN	28.6S 114.3E	1603Z 12 SEP
	ESPERANCE	34.0S 121.8E	1726Z 12 SEP
	KINGSTON SOUTH	37.0S 139.4E	1906Z 12 SEP
	EUCLA MOTEL	31.8S 128.9E	1934Z 12 SEP
	DARWIN	12.1S 130.7E	1948Z 12 SEP
	HEARD ISLAND	54.0S 73.5E	1955Z 12 SEP
	HOBART	43.3S 147.6E	2015Z 12 SEP
INDIA	GREAT NICOBAR	7.1N 93.6E	1338Z 12 SEP
	LITTLE ANDAMAN	10.7N 92.3E	1421Z 12 SEP
	PORT BLAIR	12.0N 92.5E	1440Z 12 SEP
	NORTH ANDAMAN	13.3N 92.6E	1453Z 12 SEP
	CHENNAI	13.4N 80.4E	1540Z 12 SEP
	KAKINADA	17.2N 82.7E	1604Z 12 SEP
	TRIVANDRUM	8.3N 76.9E	1608Z 12 SEP
	BALESHWAR	21.6N 87.3E	1701Z 12 SEP
	MANGALORE	13.3N 74.4E	1732Z 12 SEP
	BOMBAY	18.8N 72.6E	2005Z 12 SEP
	GULF OF KUTCH	22.7N 68.9E	2019Z 12 SEP
SRI LANKA	DONDRA HEAD	5.8N 80.5E	1447Z 12 SEP
	TRINCOMALEE	8.7N 81.3E	1502Z 12 SEP
	COLOMBO	6.9N 79.8E	1515Z 12 SEP
	JAFFNA	9.9N 80.0E	1625Z 12 SEP
THAILAND	PHUKET	8.0N 98.2E	1508Z 12 SEP
	KO PHRA THONG	9.1N 98.2E	1554Z 12 SEP
	KO TARUTAO	6.6N 99.6E	1626Z 12 SEP
UNITED KINGDOM	DIEGO GARCIA	7.3S 72.4E	1526Z 12 SEP
MALDIVES	GAN	0.6S 73.2E	1528Z 12 SEP
	MALE	4.2N 73.6E	1544Z 12 SEP
	MINICOV	8.3N 73.0E	1614Z 12 SEP
MYANMAR	PYINKAYAING	15.8N 94.2E	1537Z 12 SEP
	CHEDUBA ISLAND	18.9N 93.4E	1554Z 12 SEP
	SITTWE	20.0N 92.9E	1629Z 12 SEP

	MERGUI	12.8N	98.4E	1647Z 12 SEP
	YANGON	16.2N	96.5E	1713Z 12 SEP
MALAYSIA	GEORGETOWN	5.4N	100.1E	1704Z 12 SEP
	PORT DICKSON	2.5N	101.7E	2048Z 12 SEP
BANGLADESH	CHITTAGONG	22.5N	91.2E	1801Z 12 SEP
MAURITIUS	PORT LOUIS	20.0S	57.3E	1803Z 12 SEP
REUNION	ST DENIS	20.8S	55.2E	1820Z 12 SEP
SEYCHELLES	VICTORIA	4.5S	55.6E	1847Z 12 SEP
MADAGASCAR	TOAMASINA	17.8S	49.8E	1900Z 12 SEP
	ANTSIRANANA	12.1S	49.5E	1905Z 12 SEP
	MANAKARA	22.2S	48.2E	1919Z 12 SEP
	CAP STE MARIE	25.8S	45.2E	2009Z 12 SEP
	MAHAJANGA	15.4S	46.2E	2009Z 12 SEP
	TOLIARA	23.4S	43.6E	2034Z 12 SEP
SOMALIA	HILALAYA	6.5N	49.2E	1922Z 12 SEP
	CAPE GUARO	11.9N	51.4E	1933Z 12 SEP
	MOGADISHU	2.0N	45.5E	1938Z 12 SEP
	KAAMBOONI	1.5S	41.9E	2004Z 12 SEP
OMAN	SALALAH	17.0N	54.2E	1930Z 12 SEP
	DUQM	19.7N	57.8E	1939Z 12 SEP
	MUSCAT	23.9N	58.6E	1943Z 12 SEP
PAKISTAN	GWADAR	25.1N	62.4E	1937Z 12 SEP
	KARACHI	24.7N	66.9E	2031Z 12 SEP
IRAN	GAVATER	25.0N	61.3E	1943Z 12 SEP
YEMEN	AL MUKALLA	14.5N	49.2E	2003Z 12 SEP
	ADEN	13.0N	45.2E	2100Z 12 SEP
COMORES	MORONI	11.6S	43.3E	2006Z 12 SEP
CROZET ISLANDS	CROZET ISLANDS	46.4S	51.8E	2009Z 12 SEP
MOZAMBIQUE	CABO DELGADO	10.7S	40.7E	2034Z 12 SEP
	ANGOCHE	15.5S	40.8E	2044Z 12 SEP
	QUELIMANE	18.0S	37.1E	2213Z 12 SEP
	MAPUTO	25.9S	32.8E	2218Z 12 SEP
	BEIRA	19.9S	35.1E	2246Z 12 SEP
KENYA	MOMBASA	4.0S	39.7E	2039Z 12 SEP
TANZANIA	LINDI	9.8S	39.9E	2039Z 12 SEP
	DAR ES SALAAM	6.7S	39.4E	2047Z 12 SEP
KERGUELEN ISLAN	PORT AUX FRANCA	49.0S	69.2E	2049Z 12 SEP
SOUTH AFRICA	PRINCE EDWARD I	46.6S	37.6E	2146Z 12 SEP
	DURBAN	29.8S	31.2E	2205Z 12 SEP
	PORT ELIZABETH	33.9S	25.8E	2256Z 12 SEP
	CAPE TOWN	34.1S	18.0E	2359Z 12 SEP
SINGAPORE	SINGAPORE	1.2N	103.8E	0048Z 13 SEP

THE JAPAN METEOROLOGICAL AGENCY MAY ISSUE ADDITIONAL INFORMATION
FOR THIS EVENT. IN THE CASE OF CONFLICTING INFORMATION...THE
MORE CONSERVATIVE INFORMATION SHOULD BE USED FOR SAFETY.

TSUNAMI BULLETIN NUMBER 001
ISSUED BY THE JAPAN METEOROLOGICAL AGENCY (JMA) ISSUED AT 1136 12 SEP 2007 (UTC)

... AN INDIAN-OCEAN-WIDE TSUNAMI WATCH IS IN EFFECT ...

1.EARTHQUAKE INFORMATION
ORIGIN TIME : 1110 12 SEP 2007 (UTC)
COORDINATES : 4.5 SOUTH 101.3 EAST
LOCATION : SOUTHERN SUMATRA, INDONESIA
MAGNITUDE : 7.9

2.EVALUATION
THERE IS A POSSIBILITY OF A DESTRUCTIVE OCEAN-WIDE TSUNAMI IN THE INDIAN OCEAN.

3.ESTIMATED TSUNAMI TRAVEL TIME
ONE HOUR OR LESS
INDONESIA:
INDIAN OCEAN COAST OF SUMATRA
INDIAN OCEAN COAST OF JAWA
AUSTRALIA:
COCOS ISLANDS
ONE HOUR TO THREE HOURS
INDIA:
ALL COASTS OF ANDAMAN AND NICOBAR ISLANDS
SRI LANKA:
ALL COASTS
INDONESIA:
MALACCA COAST OF SUMATRA
SOUTH COASTS OF LESSER SUNDA ISLANDS THREE HOURS TO SIX HOURS
FRANCE:
AMSTERDAM ISLAND AND ST-PAUL
INDIA:
ARABIAN SEA COAST
BENGAL BAY COAST
MALDIVES:
ALL COASTS
MYANMAR:
BENGAL BAY COAST
ANDAMAN SEA COAST
THAILAND:
MALACCA COAST
MALAYSIA:
MALACCA COAST
INDONESIA:
ARAFURA SEA COAST FROM LETI ISLANDS TO IRIAN JAYA
EAST TIMOR:
TIMOR SEA COAST
AUSTRALIA:
NORTHWEST COAST AND WEST COAST
UNITED KINGDOM:
CHAGOS ARCHIPELAGO
SIX HOURS TO NINE HOURS
COMOROS:
ALL COASTS
FRANCE:
MAYOTTE ISLAND
REUNION ISLAND
CROZET ISLANDS
MADAGASCAR:
ALL COASTS

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  SEYCHELLES:
    ALL COASTS
  MAURITIUS:
    ALL COASTS
  MOZAMBIQUE:
    ALL COASTS
  TANZANIA:
    ALL COASTS
  KENYA:
    ALL COASTS
  SOMALI:
    INDIAN OCEAN COAST
    GULF COAST
  YEMEN:
    GULF COAST
  OMAN:
    ARABIAN SEA COAST
    GULF COAST
  UAE:
    GULF COAST
  IRAN:
    GULF COAST
  PAKISTAN:
    ARABIAN SEA COAST
  BANGLADESH:
    BENGAL BAY COAST
  AUSTRALIA:
    COASTS FROM THE GULF OF CARPENTARIA TO THE ARAFURA SEA  NINE HOURS TO TWELVE
HOURS
  SOUTH AFRICA:
    INDIAN OCEAN COAST
  FRANCE:
    KERGUELEN
  DJIBOUTI:
    GULF COAST
 TWELVE HOURS OR MORE
  SINGAPORE:
    MALACCA COAST

*TSUNAMI TRAVEL TIME IS ESTIMATED ONLY FROM EARTHQUAKE DATA  AND INDICATES THE
TIME LAPSE BETWEEN ORIGIN TIME AND TSUNAMI  ARRIVAL TIME.

*THIS WILL BE THE FINAL INFORMATION UNLESS THERE ARE CHANGES  ABOUT THE
POTENTIAL OF TSUNAMI GENERATION AND ESTIMATED TSUNAMI  TRAVEL TIME BY RE-
EVALUATION OF THE EARTHQUAKE OR THERE ARE  REPORTS ON TSUNAMI OBSERVATIONS.

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TSUNAMI WATCH INFORMATION (TWI) IS PROVIDED TO THE COUNTRIES OF THE INDIAN OCEAN
REGION FROM JMA IN COOPERATION WITH PTWC OF US ON AN INTERIM BASIS PRIOR TO THE
ESTABLISHMENT OF THE TSUNAMI EARLY WARNING SYSTEM IN THE REGION.  TWI SHOULD BE
REGARDED AS A REFERENCE MATERIAL FOR THE DISASTER PREVENTION AUTHORITIES OF THE
RECIPIENT COUNTRIES TO ISSUE TSUNAMI WARNINGS ON THEIR OWN INITIATIVE AND
RESPONSIBILITY.
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TSUNAMI BULLETIN NUMBER 002
 ISSUED BY THE JAPAN METEOROLOGICAL AGENCY (JMA)  ISSUED AT 1208 12 SEP
2007 (UTC)

 ... AN INDIAN-OCEAN-WIDE TSUNAMI WATCH IS IN EFFECT ...

1.EARTHQUAKE INFORMATION(REVISED)
 ORIGIN TIME : 1110 12 SEP 2007 (UTC)
 COORDINATES : 4.5 SOUTH 101.3 EAST
 LOCATION    : SOUTHERN SUMATRA, INDONESIA
 MAGNITUDE   : 8.2

2.EVALUATION
 THERE IS A POSSIBILITY OF A DESTRUCTIVE OCEAN-WIDE  TSUNAMI IN THE INDIAN
OCEAN.

3.ESTIMATED TSUNAMI TRAVEL TIME
 ONE HOUR OR LESS
  INDONESIA:
    INDIAN OCEAN COAST OF SUMATRA
    INDIAN OCEAN COAST OF JAWA
  AUSTRALIA:
    COCOS ISLANDS
 ONE HOUR TO THREE HOURS
  INDIA:
    ALL COASTS OF ANDAMAN AND NICOBAR ISLANDS
  SRI LANKA:
    ALL COASTS
  INDONESIA:
    MALACCA COAST OF SUMATRA
    SOUTH COASTS OF LESSER SUNDA ISLANDS  THREE HOURS TO SIX HOURS
  FRANCE:
    AMSTERDAM ISLAND AND ST-PAUL
  INDIA:
    ARABIAN SEA COAST
    BENGAL BAY COAST
  MALDIVES:
    ALL COASTS
  MYANMAR:
    BENGAL BAY COAST
    ANDAMAN SEA COAST
  THAILAND:
    MALACCA COAST
  MALAYSIA:
    MALACCA COAST
  INDONESIA:
    ARAFURA SEA COAST FROM LETI ISLANDS TO IRIAN JAYA
  EAST TIMOR:
    TIMOR SEA COAST
  AUSTRALIA:
    NORTHWEST COAST AND WEST COAST
  UNITED KINGDOM:
    CHAGOS ARCHIPELAGO
 SIX HOURS TO NINE HOURS
  COMOROS:
    ALL COASTS
  FRANCE:
    MAYOTTE ISLAND
    REUNION ISLAND
    CROZET ISLANDS
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  MADAGASCAR:
    ALL COASTS
  SEYCHELLES:
    ALL COASTS
  MAURITIUS:
    ALL COASTS
  MOZAMBIQUE:
    ALL COASTS
  TANZANIA:
    ALL COASTS
  KENYA:
    ALL COASTS
  SOMALI:
    INDIAN OCEAN COAST
    GULF COAST
  YEMEN:
    GULF COAST
  OMAN:
    ARABIAN SEA COAST
    GULF COAST
  UAE:
    GULF COAST
  IRAN:
    GULF COAST
  PAKISTAN:
    ARABIAN SEA COAST
  BANGLADESH:
    BENGAL BAY COAST
  AUSTRALIA:
    COASTS FROM THE GULF OF CARPENTARIA TO THE ARAFURA SEA  NINE HOURS TO
TWELVE HOURS
  SOUTH AFRICA:
    INDIAN OCEAN COAST
  FRANCE:
    KERGUELEN
  DJIBOUTI:
    GULF COAST
 TWELVE HOURS OR MORE
  SINGAPORE:
    MALACCA COAST

*TSUNAMI TRAVEL TIME IS ESTIMATED ONLY FROM EARTHQUAKE DATA  AND INDICATES
THE TIME LAPSE BETWEEN ORIGIN TIME AND TSUNAMI  ARRIVAL TIME.

*THIS WILL BE THE FINAL INFORMATION UNLESS THERE ARE CHANGES  ABOUT THE
POTENTIAL OF TSUNAMI GENERATION AND ESTIMATED TSUNAMI  TRAVEL TIME BY RE-
EVALUATION OF THE EARTHQUAKE OR THERE ARE  REPORTS ON TSUNAMI OBSERVATIONS.

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RECIPIENTS ARE INVITED TO CHECK THE MARCH 2005 ISSUE OF THE WORLD WEATHER
WATCH OPERATIONAL NEWSLETTER FOR THE OBJECTIVES OF TWI.
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TSUNAMI BULLETIN NUMBER 003
 ISSUED BY THE JAPAN METEOROLOGICAL AGENCY (JMA)  ISSUED AT 1251 12 SEP
2007 (UTC)

 ... AN INDIAN-OCEAN-WIDE TSUNAMI WATCH IS IN EFFECT ...

1.EARTHQUAKE INFORMATION
 ORIGIN TIME : 1110 12 SEP 2007 (UTC)
 COORDINATES : 4.5 SOUTH 101.3 EAST
 LOCATION    : SOUTHERN SUMATRA, INDONESIA
 MAGNITUDE   : 8.2

2.EVALUATION
 THERE IS A POSSIBILITY OF A DESTRUCTIVE OCEAN-WIDE  TSUNAMI IN THE INDIAN
OCEAN.

3.ESTIMATED TSUNAMI TRAVEL TIME
 ONE HOUR OR LESS
  INDONESIA:
    INDIAN OCEAN COAST OF SUMATRA
    INDIAN OCEAN COAST OF JAWA
  AUSTRALIA:
    COCOS ISLANDS
 ONE HOUR TO THREE HOURS
  INDIA:
    ALL COASTS OF ANDAMAN AND NICOBAR ISLANDS
  SRI LANKA:
    ALL COASTS
  INDONESIA:
    MALACCA COAST OF SUMATRA
    SOUTH COASTS OF LESSER SUNDA ISLANDS  THREE HOURS TO SIX HOURS
  FRANCE:
    AMSTERDAM ISLAND AND ST-PAUL
  INDIA:
    ARABIAN SEA COAST
    BENGAL BAY COAST
  MALDIVES:
    ALL COASTS
  MYANMAR:
    BENGAL BAY COAST
    ANDAMAN SEA COAST
  THAILAND:
    MALACCA COAST
  MALAYSIA:
    MALACCA COAST
  INDONESIA:
    ARAFURA SEA COAST FROM LETI ISLANDS TO IRIAN JAYA
  EAST TIMOR:
    TIMOR SEA COAST
  AUSTRALIA:
    NORTHWEST COAST AND WEST COAST
  UNITED KINGDOM:
    CHAGOS ARCHIPELAGO
 SIX HOURS TO NINE HOURS
  COMOROS:
    ALL COASTS
  FRANCE:
    MAYOTTE ISLAND
    REUNION ISLAND
    CROZET ISLANDS
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  MADAGASCAR:
    ALL COASTS
  SEYCHELLES:
    ALL COASTS
  MAURITIUS:
    ALL COASTS
  MOZAMBIQUE:
    ALL COASTS
  TANZANIA:
    ALL COASTS
  KENYA:
    ALL COASTS
  SOMALI:
    INDIAN OCEAN COAST
    GULF COAST
  YEMEN:
    GULF COAST
  OMAN:
    ARABIAN SEA COAST
    GULF COAST
  UAE:
    GULF COAST
  IRAN:
    GULF COAST
  PAKISTAN:
    ARABIAN SEA COAST
  BANGLADESH:
    BENGAL BAY COAST
  AUSTRALIA:
    COASTS FROM THE GULF OF CARPENTARIA TO THE ARAFURA SEA  NINE HOURS TO
TWELVE HOURS
  SOUTH AFRICA:
    INDIAN OCEAN COAST
  FRANCE:
    KERGUELEN
  DJIBOUTI:
    GULF COAST
 TWELVE HOURS OR MORE
  SINGAPORE:
    MALACCA COAST

4.OBSERVASIONS ON MAXIMUM TSUNAMI WAVE
 LOCATION                  COORDINATES    ARRIVAL TIME  AMPL
 ----------------          -----------    ------------  ----
 PADANG                     1.0S 100.4E   1155Z 12 SEP  0.5M
AMPL -- AMPLITUDE IN METERS OF HALF OF THE CREST TO TROUGH

*TSUNAMI TRAVEL TIME IS ESTIMATED ONLY FROM EARTHQUAKE DATA  AND INDICATES
THE TIME LAPSE BETWEEN ORIGIN TIME AND TSUNAMI  ARRIVAL TIME.

*THIS WILL BE THE FINAL INFORMATION UNLESS THERE ARE CHANGES  ABOUT THE
POTENTIAL OF TSUNAMI GENERATION AND ESTIMATED TSUNAMI  TRAVEL TIME BY RE-
EVALUATION OF THE EARTHQUAKE OR THERE ARE  REPORTS ON TSUNAMI OBSERVATIONS.

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RECIPIENTS ARE INVITED TO CHECK THE MARCH 2005 ISSUE OF THE WORLD WEATHER
WATCH OPERATIONAL NEWSLETTER FOR THE OBJECTIVES OF TWI.
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TSUNAMI BULLETIN NUMBER 004
 ISSUED BY THE JAPAN METEOROLOGICAL AGENCY (JMA)  ISSUED AT 1335 12 SEP
2007 (UTC)

 ... AN INDIAN-OCEAN-WIDE TSUNAMI WATCH IS IN EFFECT ...

1.EARTHQUAKE INFORMATION
 ORIGIN TIME : 1110 12 SEP 2007 (UTC)
 COORDINATES : 4.5 SOUTH 101.3 EAST
 LOCATION    : SOUTHERN SUMATRA, INDONESIA
 MAGNITUDE   : 8.2

2.EVALUATION
 THERE IS A POSSIBILITY OF A DESTRUCTIVE OCEAN-WIDE  TSUNAMI IN THE INDIAN
OCEAN.

3.ESTIMATED TSUNAMI TRAVEL TIME
 ONE HOUR OR LESS
  INDONESIA:
    INDIAN OCEAN COAST OF SUMATRA
    INDIAN OCEAN COAST OF JAWA
  AUSTRALIA:
    COCOS ISLANDS
 ONE HOUR TO THREE HOURS
  INDIA:
    ALL COASTS OF ANDAMAN AND NICOBAR ISLANDS
  SRI LANKA:
    ALL COASTS
  INDONESIA:
    MALACCA COAST OF SUMATRA
    SOUTH COASTS OF LESSER SUNDA ISLANDS  THREE HOURS TO SIX HOURS
  FRANCE:
    AMSTERDAM ISLAND AND ST-PAUL
  INDIA:
    ARABIAN SEA COAST
    BENGAL BAY COAST
  MALDIVES:
    ALL COASTS
  MYANMAR:
    BENGAL BAY COAST
    ANDAMAN SEA COAST
  THAILAND:
    MALACCA COAST
  MALAYSIA:
    MALACCA COAST
  INDONESIA:
    ARAFURA SEA COAST FROM LETI ISLANDS TO IRIAN JAYA
  EAST TIMOR:
    TIMOR SEA COAST
  AUSTRALIA:
    NORTHWEST COAST AND WEST COAST
  UNITED KINGDOM:
    CHAGOS ARCHIPELAGO
 SIX HOURS TO NINE HOURS
  COMOROS:
    ALL COASTS
  FRANCE:
    MAYOTTE ISLAND
    REUNION ISLAND
    CROZET ISLANDS
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  MADAGASCAR:
    ALL COASTS
  SEYCHELLES:
    ALL COASTS
  MAURITIUS:
    ALL COASTS
  MOZAMBIQUE:
    ALL COASTS
  TANZANIA:
    ALL COASTS
  KENYA:
    ALL COASTS
  SOMALI:
    INDIAN OCEAN COAST
    GULF COAST
  YEMEN:
    GULF COAST
  OMAN:
    ARABIAN SEA COAST
    GULF COAST
  UAE:
    GULF COAST
  IRAN:
    GULF COAST
  PAKISTAN:
    ARABIAN SEA COAST
  BANGLADESH:
    BENGAL BAY COAST
  AUSTRALIA:
    COASTS FROM THE GULF OF CARPENTARIA TO THE ARAFURA SEA  NINE HOURS TO
TWELVE HOURS
  SOUTH AFRICA:
    INDIAN OCEAN COAST
  FRANCE:
    KERGUELEN
  DJIBOUTI:
    GULF COAST
 TWELVE HOURS OR MORE
  SINGAPORE:
    MALACCA COAST

4.OBSERVASIONS ON MAXIMUM TSUNAMI WAVE
 LOCATION                  COORDINATES    ARRIVAL TIME  AMPL
 ----------------          -----------    ------------  ----
 COCOS                     12.1S  96.9E   1228Z 12 SEP  0.1M
 PADANG                     1.0S 100.4E   1155Z 12 SEP  0.6M
AMPL -- AMPLITUDE IN METERS OF HALF OF THE CREST TO TROUGH

*TSUNAMI TRAVEL TIME IS ESTIMATED ONLY FROM EARTHQUAKE DATA  AND INDICATES
THE TIME LAPSE BETWEEN ORIGIN TIME AND TSUNAMI  ARRIVAL TIME.

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EVALUATION OF THE EARTHQUAKE OR THERE ARE  REPORTS ON TSUNAMI OBSERVATIONS.

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TSUNAMI BULLETIN NUMBER 005
 ISSUED BY THE JAPAN METEOROLOGICAL AGENCY (JMA)  ISSUED AT 1425 12 SEP
2007 (UTC)

 ... AN INDIAN-OCEAN-WIDE TSUNAMI WATCH IS IN EFFECT ...

1.EARTHQUAKE INFORMATION
 ORIGIN TIME : 1110 12 SEP 2007 (UTC)
 COORDINATES : 4.5 SOUTH 101.3 EAST
 LOCATION    : SOUTHERN SUMATRA, INDONESIA
 MAGNITUDE   : 8.2

2.EVALUATION
 THERE IS A POSSIBILITY OF A DESTRUCTIVE OCEAN-WIDE  TSUNAMI IN THE INDIAN
OCEAN.

3.ESTIMATED TSUNAMI TRAVEL TIME
 ONE HOUR OR LESS
  INDONESIA:
    INDIAN OCEAN COAST OF SUMATRA
    INDIAN OCEAN COAST OF JAWA
  AUSTRALIA:
    COCOS ISLANDS
 ONE HOUR TO THREE HOURS
  INDIA:
    ALL COASTS OF ANDAMAN AND NICOBAR ISLANDS
  SRI LANKA:
    ALL COASTS
  INDONESIA:
    MALACCA COAST OF SUMATRA
    SOUTH COASTS OF LESSER SUNDA ISLANDS  THREE HOURS TO SIX HOURS
  FRANCE:
    AMSTERDAM ISLAND AND ST-PAUL
  INDIA:
    ARABIAN SEA COAST
    BENGAL BAY COAST
  MALDIVES:
    ALL COASTS
  MYANMAR:
    BENGAL BAY COAST
    ANDAMAN SEA COAST
  THAILAND:
    MALACCA COAST
  MALAYSIA:
    MALACCA COAST
  INDONESIA:
    ARAFURA SEA COAST FROM LETI ISLANDS TO IRIAN JAYA
  EAST TIMOR:
    TIMOR SEA COAST
  AUSTRALIA:
    NORTHWEST COAST AND WEST COAST
  UNITED KINGDOM:
    CHAGOS ARCHIPELAGO
 SIX HOURS TO NINE HOURS
  COMOROS:
    ALL COASTS
  FRANCE:
    MAYOTTE ISLAND
    REUNION ISLAND
    CROZET ISLANDS
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  MADAGASCAR:
    ALL COASTS
  SEYCHELLES:
    ALL COASTS
  MAURITIUS:
    ALL COASTS
  MOZAMBIQUE:
    ALL COASTS
  TANZANIA:
    ALL COASTS
  KENYA:
    ALL COASTS
  SOMALI:
    INDIAN OCEAN COAST
    GULF COAST
  YEMEN:
    GULF COAST
  OMAN:
    ARABIAN SEA COAST
    GULF COAST
  UAE:
    GULF COAST
  IRAN:
    GULF COAST
  PAKISTAN:
    ARABIAN SEA COAST
  BANGLADESH:
    BENGAL BAY COAST
  AUSTRALIA:
    COASTS FROM THE GULF OF CARPENTARIA TO THE ARAFURA SEA  NINE HOURS TO
TWELVE HOURS
  SOUTH AFRICA:
    INDIAN OCEAN COAST
  FRANCE:
    KERGUELEN
  DJIBOUTI:
    GULF COAST
 TWELVE HOURS OR MORE
  SINGAPORE:
    MALACCA COAST

4.OBSERVASIONS ON MAXIMUM TSUNAMI WAVE
 LOCATION                  COORDINATES    ARRIVAL TIME  AMPL
 ----------------          -----------    ------------  ----
 COCOS                     12.1S  96.9E   1228Z 12 SEP  0.1M
 PADANG                     1.0S 100.4E   1155Z 12 SEP  1.0M
AMPL -- AMPLITUDE IN METERS OF HALF OF THE CREST TO TROUGH

*TSUNAMI TRAVEL TIME IS ESTIMATED ONLY FROM EARTHQUAKE DATA  AND INDICATES
THE TIME LAPSE BETWEEN ORIGIN TIME AND TSUNAMI  ARRIVAL TIME.

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EVALUATION OF THE EARTHQUAKE OR THERE ARE  REPORTS ON TSUNAMI OBSERVATIONS.

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TSUNAMI BULLETIN NUMBER 006
 ISSUED BY THE JAPAN METEOROLOGICAL AGENCY (JMA)  ISSUED AT 1726 12 SEP
2007 (UTC)

 ... AN INDIAN-OCEAN-WIDE TSUNAMI WATCH IS IN EFFECT ...

1.EARTHQUAKE INFORMATION
 ORIGIN TIME : 1110 12 SEP 2007 (UTC)
 COORDINATES : 4.5 SOUTH 101.3 EAST
 LOCATION    : SOUTHERN SUMATRA, INDONESIA
 MAGNITUDE   : 8.2

2.EVALUATION
 THERE IS A POSSIBILITY OF A DESTRUCTIVE OCEAN-WIDE  TSUNAMI IN THE INDIAN
OCEAN.

3.ESTIMATED TSUNAMI TRAVEL TIME
 ONE HOUR OR LESS
  INDONESIA:
    INDIAN OCEAN COAST OF SUMATRA
    INDIAN OCEAN COAST OF JAWA
  AUSTRALIA:
    COCOS ISLANDS
 ONE HOUR TO THREE HOURS
  INDIA:
    ALL COASTS OF ANDAMAN AND NICOBAR ISLANDS
  SRI LANKA:
    ALL COASTS
  INDONESIA:
    MALACCA COAST OF SUMATRA
    SOUTH COASTS OF LESSER SUNDA ISLANDS  THREE HOURS TO SIX HOURS
  FRANCE:
    AMSTERDAM ISLAND AND ST-PAUL
  INDIA:
    ARABIAN SEA COAST
    BENGAL BAY COAST
  MALDIVES:
    ALL COASTS
  MYANMAR:
    BENGAL BAY COAST
    ANDAMAN SEA COAST
  THAILAND:
    MALACCA COAST
  MALAYSIA:
    MALACCA COAST
  INDONESIA:
    ARAFURA SEA COAST FROM LETI ISLANDS TO IRIAN JAYA
  EAST TIMOR:
    TIMOR SEA COAST
  AUSTRALIA:
    NORTHWEST COAST AND WEST COAST
  UNITED KINGDOM:
    CHAGOS ARCHIPELAGO
 SIX HOURS TO NINE HOURS
  COMOROS:
    ALL COASTS
  FRANCE:
    MAYOTTE ISLAND
    REUNION ISLAND
    CROZET ISLANDS
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  MADAGASCAR:
    ALL COASTS
  SEYCHELLES:
    ALL COASTS
  MAURITIUS:
    ALL COASTS
  MOZAMBIQUE:
    ALL COASTS
  TANZANIA:
    ALL COASTS
  KENYA:
    ALL COASTS
  SOMALI:
    INDIAN OCEAN COAST
    GULF COAST
  YEMEN:
    GULF COAST
  OMAN:
    ARABIAN SEA COAST
    GULF COAST
  UAE:
    GULF COAST
  IRAN:
    GULF COAST
  PAKISTAN:
    ARABIAN SEA COAST
  BANGLADESH:
    BENGAL BAY COAST
  AUSTRALIA:
    COASTS FROM THE GULF OF CARPENTARIA TO THE ARAFURA SEA  NINE HOURS TO
TWELVE HOURS
  SOUTH AFRICA:
    INDIAN OCEAN COAST
  FRANCE:
    KERGUELEN
  DJIBOUTI:
    GULF COAST
 TWELVE HOURS OR MORE
  SINGAPORE:
    MALACCA COAST

4.OBSERVASIONS ON MAXIMUM TSUNAMI WAVE
 LOCATION                  COORDINATES    ARRIVAL TIME  AMPL
 ----------------          -----------    ------------  ----
 COCOS                     12.1S  96.9E   1228Z 12 SEP  0.1M
 HANIMAADHOO                6.8N  73.2E   1557Z 12 SEP  0.4M
 PADANG                     1.0S 100.4E   1155Z 12 SEP  1.1M
AMPL -- AMPLITUDE IN METERS OF HALF OF THE CREST TO TROUGH

*TSUNAMI TRAVEL TIME IS ESTIMATED ONLY FROM EARTHQUAKE DATA  AND INDICATES
THE TIME LAPSE BETWEEN ORIGIN TIME AND TSUNAMI  ARRIVAL TIME.

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POTENTIAL OF TSUNAMI GENERATION AND ESTIMATED TSUNAMI  TRAVEL TIME BY RE-
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TSUNAMI BULLETIN NUMBER 007
 ISSUED BY THE JAPAN METEOROLOGICAL AGENCY (JMA)  ISSUED AT 2110 12 SEP
2007 (UTC)

 ... AN INDIAN-OCEAN-WIDE TSUNAMI WATCH IS IN EFFECT ...

1.EARTHQUAKE INFORMATION
 ORIGIN TIME : 1110 12 SEP 2007 (UTC)
 COORDINATES : 4.5 SOUTH 101.3 EAST
 LOCATION    : SOUTHERN SUMATRA, INDONESIA
 MAGNITUDE   : 8.2

2.EVALUATION
 THERE IS A POSSIBILITY OF A DESTRUCTIVE OCEAN-WIDE  TSUNAMI IN THE INDIAN
OCEAN.

3.ESTIMATED TSUNAMI TRAVEL TIME
 ONE HOUR OR LESS
  INDONESIA:
    INDIAN OCEAN COAST OF SUMATRA
    INDIAN OCEAN COAST OF JAWA
  AUSTRALIA:
    COCOS ISLANDS
 ONE HOUR TO THREE HOURS
  INDIA:
    ALL COASTS OF ANDAMAN AND NICOBAR ISLANDS
  SRI LANKA:
    ALL COASTS
  INDONESIA:
    MALACCA COAST OF SUMATRA
    SOUTH COASTS OF LESSER SUNDA ISLANDS  THREE HOURS TO SIX HOURS
  FRANCE:
    AMSTERDAM ISLAND AND ST-PAUL
  INDIA:
    ARABIAN SEA COAST
    BENGAL BAY COAST
  MALDIVES:
    ALL COASTS
  MYANMAR:
    BENGAL BAY COAST
    ANDAMAN SEA COAST
  THAILAND:
    MALACCA COAST
  MALAYSIA:
    MALACCA COAST
  INDONESIA:
    ARAFURA SEA COAST FROM LETI ISLANDS TO IRIAN JAYA
  EAST TIMOR:
    TIMOR SEA COAST
  AUSTRALIA:
    NORTHWEST COAST AND WEST COAST
  UNITED KINGDOM:
    CHAGOS ARCHIPELAGO
 SIX HOURS TO NINE HOURS
  COMOROS:
    ALL COASTS
  FRANCE:
    MAYOTTE ISLAND
    REUNION ISLAND
    CROZET ISLANDS
  MADAGASCAR:
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    ALL COASTS
  SEYCHELLES:
    ALL COASTS
  MAURITIUS:
    ALL COASTS
  MOZAMBIQUE:
    ALL COASTS
  TANZANIA:
    ALL COASTS
  KENYA:
    ALL COASTS
  SOMALI:
    INDIAN OCEAN COAST
    GULF COAST
  YEMEN:
    GULF COAST
  OMAN:
    ARABIAN SEA COAST
    GULF COAST
  UAE:
    GULF COAST
  IRAN:
    GULF COAST
  PAKISTAN:
    ARABIAN SEA COAST
  BANGLADESH:
    BENGAL BAY COAST
  AUSTRALIA:
    COASTS FROM THE GULF OF CARPENTARIA TO THE ARAFURA SEA  NINE HOURS TO
TWELVE HOURS
  SOUTH AFRICA:
    INDIAN OCEAN COAST
  FRANCE:
    KERGUELEN
  DJIBOUTI:
    GULF COAST
 TWELVE HOURS OR MORE
  SINGAPORE:
    MALACCA COAST

4.OBSERVASIONS ON MAXIMUM TSUNAMI WAVE
 LOCATION                  COORDINATES    ARRIVAL TIME  AMPL
 -----------------         ------------   ------------  ----
 COCOS                     12.1S  96.9E   1228Z 12 SEP  0.1M
 HANIMAADHOO                6.8N  73.2E   1557Z 12 SEP  0.4M
 PADANG                     1.0S 100.4E   1155Z 12 SEP  1.1M
 PORT LA RUE                4.7S  55.5E   1821Z 12 SEP  0.6M
 RODRIGUES                 19.7S  63.4E   1713Z 12 SEP  0.6M
AMPL -- AMPLITUDE IN METERS OF HALF OF THE CREST TO TROUGH

*TSUNAMI TRAVEL TIME IS ESTIMATED ONLY FROM EARTHQUAKE DATA  AND INDICATES
THE TIME LAPSE BETWEEN ORIGIN TIME AND TSUNAMI  ARRIVAL TIME.

*THIS WILL BE THE FINAL INFORMATION UNLESS THERE ARE CHANGES  ABOUT THE
POTENTIAL OF TSUNAMI GENERATION AND ESTIMATED TSUNAMI  TRAVEL TIME BY RE-
EVALUATION OF THE EARTHQUAKE OR THERE ARE  REPORTS ON TSUNAMI OBSERVATIONS.

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Annex 2: Survey Questionnaire

12 SEPTEMBER 2007 SUMATRA EARTHQUAKE AND TSUNAMI EVENT

POST-EVENT ASSESSMENT QUESTIONNAIRE

COUNTRY: _____

Contact Details

Contact Name:		
Name of Organisation		
Address		
Phone		Fax:
Email		

Instructions

This is an electronic form which can be filled out in several ways:

1) If you use Microsoft Word software you can fill out the form electronically. To tick checkboxes (yes/no answers), you can either use the tab button or the mouse to move to the required answer. Written answers can be typed in the grey area next to the questions, and the area will expand to fit longer answers.
2) If the form fields don't work, then you can type your answers next to the relevant question.
3) Please give all times in UTC, not local time.
4) Please include as much information as possible in your answers. If there is not enough room on the questionnaire form, then please send extra information in a separate document.
5) Where multiple answers are possible, please feel free to tick more than one box.

You may also print the questionnaire and fill out by hand, then scan/email or fax it back to us.

We may need to contact you to clarify your answers, so please include a contact phone number where we can reach you.

12 SEPTEMBER 2007 SUMATRA EARTHQUAKE AND TSUNAMI EVENT

POST-EVENT ASSESSMENT QUESTIONNAIRE

SECTION A – INTERIM ADVISORY SERVICE

Although there was a subsequent event on 13th September, for the purpose of this questionnaire we are considering the event of **12th September only**.

1) **How and at what time (UTC) did you learn that a big earthquake had taken place?**

   How: Time (UTC):

2) **Did you receive the first tsunami watch bulletin from the PTWC and/or JMA?**

   Yes ☐ No ☐

   If YES to either or both, at what time was the bulletin received(UTC)?

   PTWC: JMA:

3) **How did you receive the bulletin (cross more than one box if appropriate)?**

   Email:☐ Fax: ☐ GTS: ☐

   Phone:☐ Other (please specify):

4) **Did you acknowledge receipt of the bulletin?**

   Yes ☐ No ☐

5) **Were subsequent bulletins received from PTWC, JMA or another source?**

   Yes ☐ No ☐

If YES, please list the bulletin numbers and the time (UTC) you received them.

JMA	Time UTC	PTWC	Time UTC	Others	TimeUTC
No…		**No…**		**No…**	
No…		**No…**		**No…**	
No…		**No…**		**No…**	
No…		**No…**		**No…**	
No…		**No…**		**No…**	
No…		**No…**		**No…**	

(Add more rows if necessary)

6) **Was information about the earthquake received from other sources?**

   Yes ☐ No ☐ If YES, please provide details:

SECTION B – NATIONAL ACTIONS

The purpose of this section is to find out what actions were taken by National Warning Centres, including independent analysis of the event, notification of relevant organisations, issuing and cancellation of warnings.

7) Were any earthquake parameters calculated at the national level?

Yes ☐ No ☐

If YES, please specify:

Location: Depth: Magnitude: Scale:

8) Was any action taken BEFORE receiving the PTWC/JMA information?

Yes ☐ No ☐

If YES, please give details:

9) What action was taken after receiving the first bulletin? Please list times (UTC) as well as actions. Include details of organisations or government agencies contacted.

Action Taken	Time (UTC)

(Add more rows if necessary)

10) Did your National Warning Centre issue a tsunami warning to the public? If yes, what time was it issued (UTC)?

Yes: ☐ Time: No: ☐

11) If a tsunami warning was issued to the public, was the warning based on bulletins from the PTWC and/or JMA, or on information determined by your National Warning Centre?

PTWC: ☐ JMA: ☐ National TWC: ☐

12) If a tsunami warning was issued to the public, was a tsunami wave height forecast provided?

Yes ☐ No ☐

If YES, please provide details:

13) **How was the warning issued? (eg phone, fax, email, sirens, police etc). Cross more than one box if appropriate.**

Phone: ☐ Fax: ☐ Email: ☐ sirens: ☐

Other (please specify)

14) **If a warning was issued, what time was the warning cancelled (UTC)? What was the reason for cancellation? How was this information communicated to the public?**

Time of Cancellation:

Reason for Cancellation:

Communication method:

15) **Were there any communication problems with distributing the tsunami warning or cancellation information? (eg mobile phone network overload, people not answering phones etc).**

Yes ☐ No ☐

If YES, please provide details:

SECTION C – NATIONAL RESPONSE

The purpose of this section is to find out what the national and local response was to the event after the tsunami warning had been issued by the National Warning Centre.

16) **If a tsunami warning was issued, what actions were taken by the national disaster management organisation (or equivalent)?**

Action taken	**Time (UTC)**

(Add more rows if necessary)

17) **Were any areas evacuated?**

Yes: ☐ No: ☐

If YES, please provide details in the following table:

Area Evacuated	Time (UTC)	Estimated No. People Evacuated

(Add more rows if necessary)

18) If an evacuation occurred, did the process happen smoothly?

Yes: ☐ No: ☐

If NO, please provide details of problems encountered:

19) Did people in some areas self-evacuate before a warning was issued?

Yes: ☐ No: ☐

If YES, please provide details in the following table:

Area	Time (UTC)	Estimated No. People Evacuated

(Add more rows if necessary)

SECTION D – MONITORING AND MODELLING

20) Were sea level data monitored during the event?

Yes ☐ No ☐

If YES, which stations were monitored and how where they monitored?

Sea Level station	Monitoring method
	GTS ☐ ODINAFRICA ☐ Other ☐
	GTS ☐ ODINAFRICA ☐ Other ☐
	GTS ☐ ODINAFRICA ☐ Other ☐
	GTS ☐ ODINAFRICA ☐ Other ☐
	GTS ☐ ODINAFRICA ☐ Other ☐

(Add more rows if necessary)

21) **If the answer to question 20 is NO, does your National Warning Centre know how to access sea level data over the GTS or on the ODINAFRICA website?**

GTS: Yes ☐ No ☐

ODINAFRICA: Yes ☐ No ☐

22) **Did your National Warning Centre use any numerical model scenarios during the event (deep ocean propagation and/or inundation model scenarios)?**

Yes: ☐ No: ☐

SECTION E – OTHER INFORMATION

Please feel free to provide any further information you would like to be included in the report. This could include comments which you can type below, or attachments such as photographs, or any other documents you consider relevant. We would particularly welcome copies of any national post-event assessment reports that are available