

Timeline: July 17, 2006 Java, Indonesia Earthquake and Tsunami

5 September 2006

Compiled by IOC ITIC

Summary of Event Information: <http://ioc3.unesco.org/itic/contents.php?id=355>

Elapsed

<u>UTC</u>	<u>Time</u>	<u>Action</u>
0819		Earthquake occurs (USGS and Harvard CMT: 9.28S, 107.38E, 34 km, Mw7.7)
0821	0:02	BMG calls start to be received
0824	0:05	BMG SMS alert reporting automatic solution using 8 stations, ML6.8
0825	0:06	BMG Mb5.5 => large difference in M implies non-typical earthquake PTWC Seismic Alarm triggers alerting PTWC duty staff
0826	0:07	BMG press inquiry on phone and issued to media - caution for tsunami JMA Operations Trigger for Distant Earthquake
0827	0:08	BMG unsuccessful to contact local government official in the coastal area by telephone due to unavailability of communication contact points at the said areas. SMS message sent to list of about 400 available addresses, though list did not contain many Java coastal addresses.
0829	0:10	NEIC Short Period Alarm
0831	0:12	PTWC Observatory Message with preliminary epicenter (9.3S, 107.3E), magnitude (Mwp 7.3) and P-wave arrival times disseminated to other observatories (e.g., JMA, WC/ATWC)
0832	0:13	JMA receives PTWC Observatory Message
0833	0:14	WC/ATWC calls to PTWC (determines that WC/ATWC does not need to issue a bulletin since the earthquake is not in the Pacific Ocean)
0836	0:17	PTWC Bulletin #1 - Indian Ocean Local Tsunami Watch Message disseminated via GTS, email, fax, putting Indonesia and Australia in a Watch, M 7.2; providing estimated tsunami arrival times for tsunami forecast points at Christmas Island, Australia (0836), Cilacap, Indonesia (0900) NEIC – initial automatic solution, Mwp 7.2
0838	0:19	JMA receives PTWC Bulletin #1
0839	0:20	PTWC confirms with Emergency Management Australia by Telephone
0840	0:21	Tsunami arrival, Pangandaran , According to the witness accounts, the sea level went down at first due to the tsunami wave. The wave came twice: 1st wave was 3m and 2 nd wave was 5m. According to the witness accounts, in the whole Pangandran, the tsunami wave came into 500m inland from the shore line. The earthquake continued for 3 minutes.
0841	0:22	NEIC Mw 7.2 from Body Wave Moment Tensor
0843	0:24	PTWC attempts to confirm with Indonesia BMG by Telephone (no answer) (10 attempts in 12 minutes to three phone numbers)
0846	0:27	JMA Bulletin #1 – Indian Ocean Local Tsunami Watch disseminated via GTS and email, providing estimated tsunami travel times of 1 hour or less to Indonesia Indian Coast of Sumatra, Jawa, and south coasts of Lesser Sunda Islands, and Australia Cocos Islands JMA receives NEIC Bulletin

0849- 0:30- **Tsunami arrival, Parang Endok DIY:** 3-4 waves, Receding wave 50-100m, No
 0859 0:40 shaking, only heard explosions before tsunami
 ??? Tsunami arrival, Suwuk–Kebumen: Receding wave >100m, 3 waves, 2nd biggest;
 Weak shaking, heard explosions before tsunami
 0849 0:30 JMA Fax Message of JMA Bulletin #1
 0900 BMG checks email from PTWC, JMA
0904 0:45 **Tsunami wave arrival, Ayah – Kebumen:** 4-5 waves, 1st biggest; No
 shaking or slight shaking; Hear twice explosions before wave coming
0909 0:50 **Tsunami wave arrival, Bunton – Cilacap:** High waves (- 5m) but breaking
 into 1-1.5m small waves, 2 waves, 1st biggest; Explosions not heard before
 arrival
0914 0:55 **Tsunami wave arrival, Cikembulan 1–Ciamis:** Some explosions before arrival
 0923 1:04 NEIC Reviewed solution – took longer than usual because of recent staffing
 changes as well as complexity due to the ‘slow’ nature of the earthquake
 rupture. For most global earthquakes, reviewed solution available within 20-
 30 min (for May Tonga earthquake, it was about 20 min)
0930 1:11 **PTWC Report** from Australia Bureau of Meteorology, **0.6m amplitude**
tsunami on Christmas Island gauge near epicenter
 0945 1:26 PTWC call from CNN – they report 6-ft tsunami in Indonesia
1030 2:11 **PTWC and JMA receive 1st sea level readings from Benoa, Indonesia**
 (which were transmitting every 15 min) show 4-cm amplitude tsunami at 0951
 (1:32 after earthquake)
1108 2:49 **PTWC Bulletin #2** - Local Tsunami Watch Follow-Up Message disseminated
 indicated media reports of a damaging tsunami in Indonesia and that a threat of
 a wide spread tsunami was not probable; reporting observed 0.04m tsunami at
 Benoa
 1110 2:51 JMA receives PTWC Bulletin #2
1143 3:24 **JMA Bulletin #2** – Indian Ocean Local Tsunami Watch, reporting Benoa,
 Indonesia observed maximum tsunami of 0.2m at 1944 JST
1225 4:06 **JMA Bulletin #3** – Indian Ocean Local Tsunami Watch, correcting
 maximum tsunami arrival time from JST to UTC time (1044) in #2
 1432 6:13 Harvard CMT Mw 7.7
 1457 6:38 JMA receives USGS M7.7
1850 10:31 **JMA Bulletin #4** – Final Bulletin, Indian Ocean Local Tsunami Watch,
 reporting Rodrigues Island, Mauritius maximum tsunami of 0.4m at 1750

All times are UCT. Italicized times are best guess.

EVENT NOTES:

Event Note: This was a 'slow' earthquake characterized by low levels of the 1st-arriving, high-frequency radiation (resulting in a small Mwp), but high levels of later-arriving, low-frequency radiation (resulting in Mw7.7). A typical tectonic earthquake would have high levels in both the high and low-frequency band so that Mwp and Mw are very close or identical. This event was also called a 'tsunami earthquake,' which is an earthquake that generates a tsunami even though its earthquake magnitude is relatively low (and so not considered to be tsunamigenic). 'Tsunami earthquakes' are often caused by 'slow' earthquakes.

TWC Notes: 1. By current protocols, PTWC and JMA are providing an interim service and only issue Tsunami Watch bulletins to the Indian Ocean Region. Warnings are issued by the countries.
2. By current protocols, only a single initial Watch bulletin is issued unless other information becomes available.

Notification: 1. Although phones seemed to be ringing, there was no answer on any of the operational phone numbers PTWC has for Indonesia.
2. There was no dissemination system established from BMG to any local government or authorities other than the limited lists of SMS and email.

BMG NOTES ((as of 17 August 2006):

In response to event, Indonesia BMG has made improvements to its TWC operations:

1. New telephone lines are now available
2. Dedicated communication links from BMG to
 - a. Police communication networks, from Police Headquarter to district level
 - b. Dept of Internal Affairs network to Governor offices to district level
 - c. Media centers of Radio and TV broadcasting services

Points of Contact:

BMG: Prih Harjadi, Fauzi, Suhardjono

PTWC: Charles McCreery

JMA: Osamu Kamigaichi

USGS: Stuart Sipkin

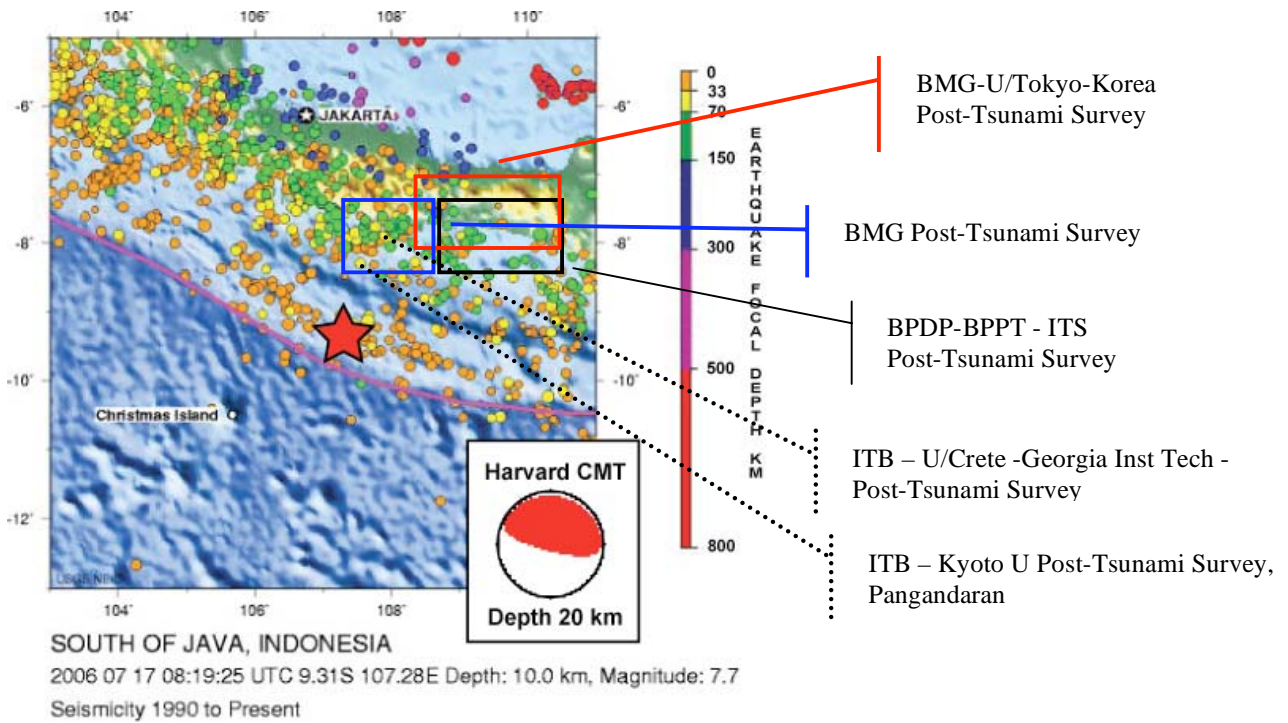
Germany: Joachim Saul

IOC: Laura Kong, Masahiro Yamamoto

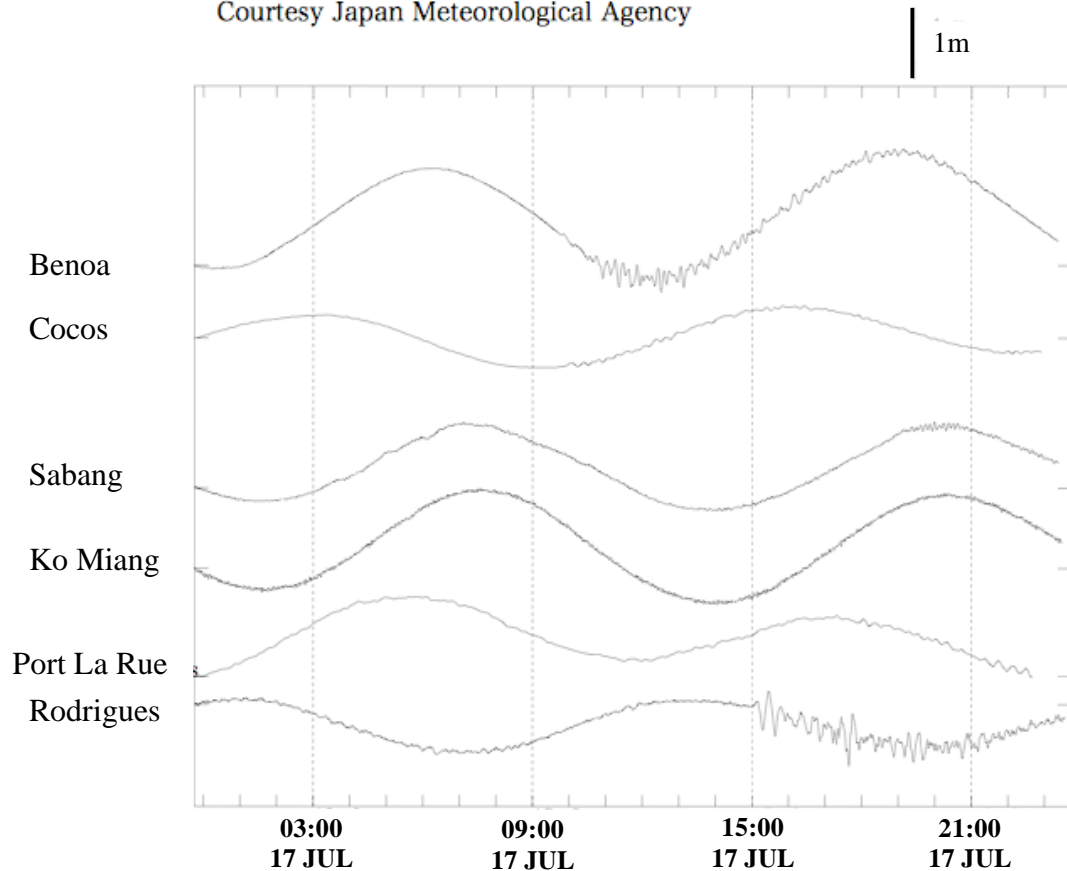
Information Sources:

1. BMG, Germany, JMA, PTWC, USGS NEIC, 29 July 2006, BMG Technical meeting, Bali
 2. BPDP-BPPT & ITS (Widjo Kongko, Suranto, Chaeroni, Aprijanto, Zikra, Sujantoko), Rapid Survey on Java Tsunami 17 July 2006, presented ICG/IOTWS-III, WG4, 29 July 2006
 3. BMG - ERI/Utoko, Japan – Korea Institute of Earthquake Information, Field survey of the tsunami inundated heights due to the Java Tsunami (2006/07/17) along the coast on the Indian Ocean in Java Island, http://www.eri.u-tokyo.ac.jp/tsunami/javasurvey/index_e.htm
 4. Fachrizal, Sugeng Pribadi, and Iwan Hermawan, 2006, Laporan Survey Gempabumidan Tsunami Selatan Jawa Barat 17 Juli 2006, Badan Meteorologidan Geofisika, pp.77.
 5. ITIC communications
Tsunami Bulletin Board postings:
 - i. Sea level data; posted by Dr. Alexander Rabinovich, Institute of Ocean Science, Sydney, Canada, 25 July, 2 Aug 2006; Data from Pacific Tsunami Warning Center, Australia Bureau of Meteorology
 - ii. Post-Tsunami Survey 4-11 Aug 2006, BMG-U/Tokyo, Korea Institute of Earthquake Information, posted by Y. Namegaya, 13 Aug 2006
 - iii. Post-Tsunami Survey 20-21 July 2006, ITB-Kyoto Univ, posted by J. Mori, 27 Jul 2006
- Other
- i. Post-Tsunami Survey, Nusa Kambangan, ~August 5-10, 2006, ITB, Univ. of Crete, Georgia Institute of Technology, pers. comm. by H. Fritz to L. Kong 14 Aug 2006

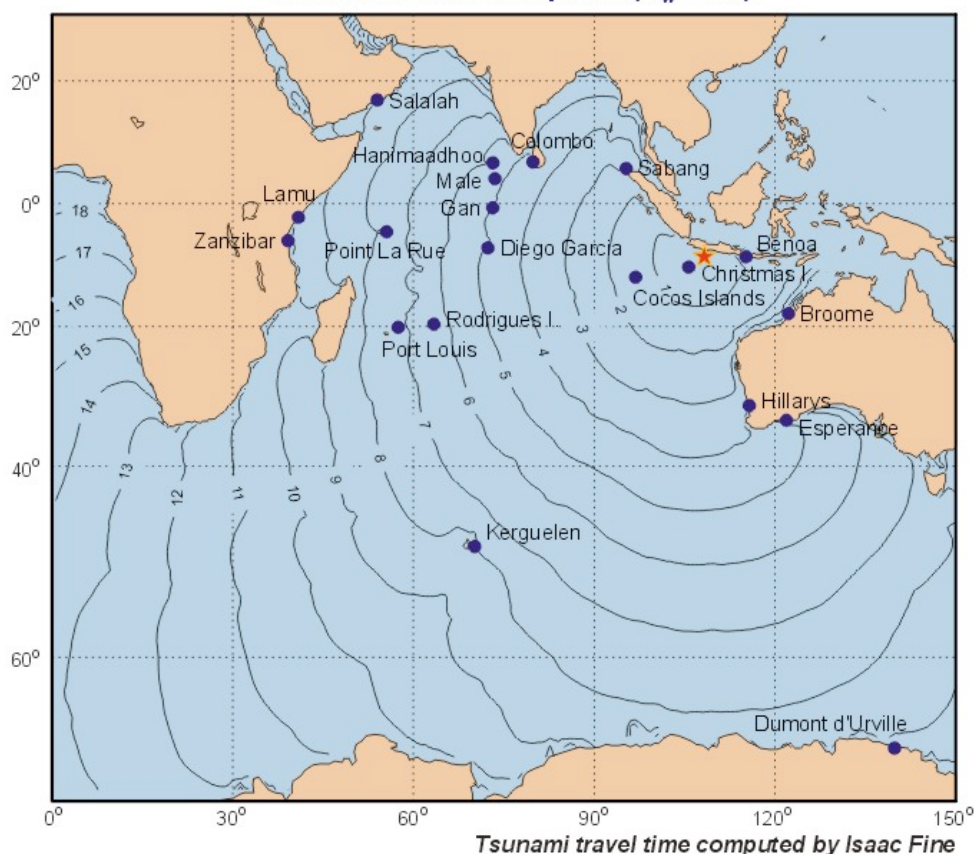
Courtesy USGS, Harvard University



Courtesy Japan Meteorological Agency



Southern Jawa Earthquake ($M_w = 7.7$)



Calculated Tsunami Travel Times for Indian Ocean Sea level Stations (black dots) recording the tsunami of 17 July 2006. Epicenter shown by red star. Sea Level data are shown on the following page. Travel time plot and sea level data plots posted to the ITIC Tsunami Bulletin Board (TBB) by Dr. Alexander Rabinovich, Institute of Ocean Science, Sydney, Canada, 2 Aug 2006.

Preliminary estimates of tsunami arrival times (statistically-determined) were posted to TBB by Dr. Rabinovich on 25 July 2006. The following is excerpted:

The Southern Jawa tsunami of 17 July 2006 was clearly recorded by several tide gauges in the Indian Ocean. The preliminary rough statistical estimates are the following:

Site	Country	Arrival time	Travel time	1st wave sign	Max wave height (cm)
Christmas I.	Australia	08:37	0hr 18m	+	82.7
Cocos Is.	Australia	09:50	1hr 31m	+	11.9
Benoa	Indonesia	09:48	1hr 29m	+	24.3
Sabang	Indonesia	12:06	3hr 47m	+	11.9
Hillarys	Australia	12:32	4hr 13m	+	28.8
Broome	Australia	13:02	4hr 43m	+	4.5
Esperance	Australia	~14:35	~6hr 16m	?	19.5
Hanimaadhoo	Maldives	~12:30	~4hr 11m	?	21.4
Rodriguez	Mauritius	15:04	6hr 45m	+	73.8

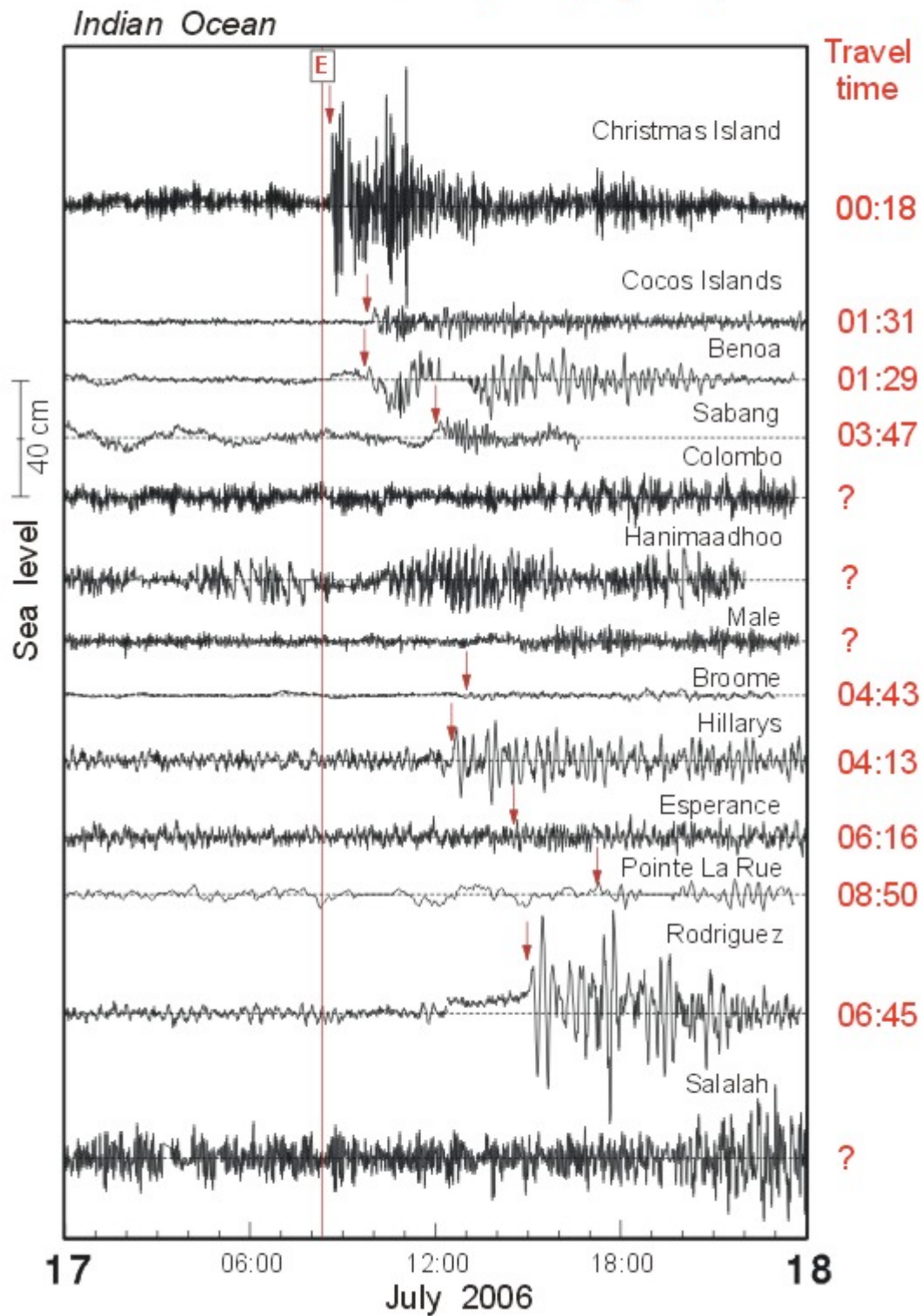
Notes:

1. The records from Hillarys and Hanimaadhoo are very noisy, so the estimates of the arrival times are very approximate.
2. Also I could not yet identify reliably tsunami waves in the records of Male and Colombo also because of very high noise.
3. Arrival time for Sabang was found to be 19:06 but I supposed that the timing for this station was in local time (GMT+7).
4. The record for Rodriguez is very clear and spectacular!

Data Source:

1. The data from the Australian stations came from the Australian Bureau of Meteorology. Thanks a lot to Paul Davill, Mike Davis and Diane Greenslade!
2. All other data came from Pacific Tsunami Warning Center, Ewa Beach, HI. Thanks for the great help to Stuart Weinstein!

Southern Jawa Earthquake ($M_w = 7.7$)

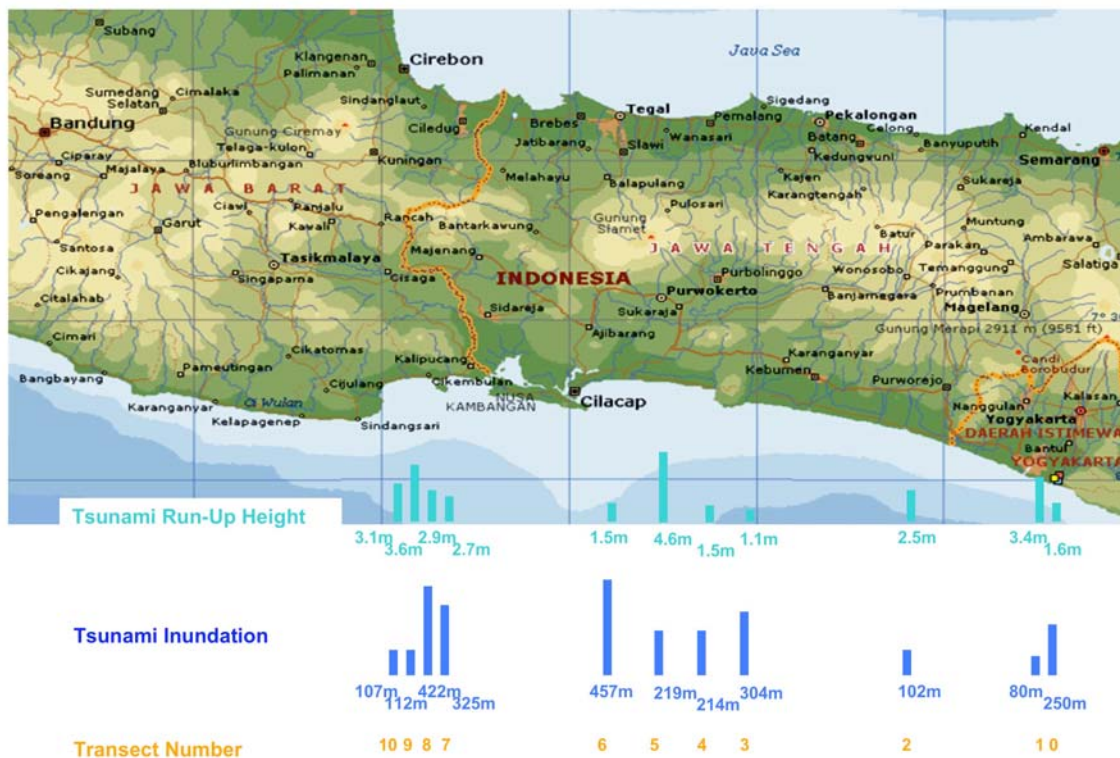


Courtesy Dr. Alexander Rabinovich, Institute of Ocean Science, Sydney, Canada,
Bureau of Meteorology, Pacific Tsunami Warning Center

Post-Tsunami Survey, 19-21 July 2006, BDPD-BPPT – ITS, Widjo et.al. 2006
 38 GPS Waypoints Record, 10 Transects of Ground Profile, 20 Points of Flowdepth



LAMPIRAN TSUNAMI RUN-UP HEIGHT and INUNDATION



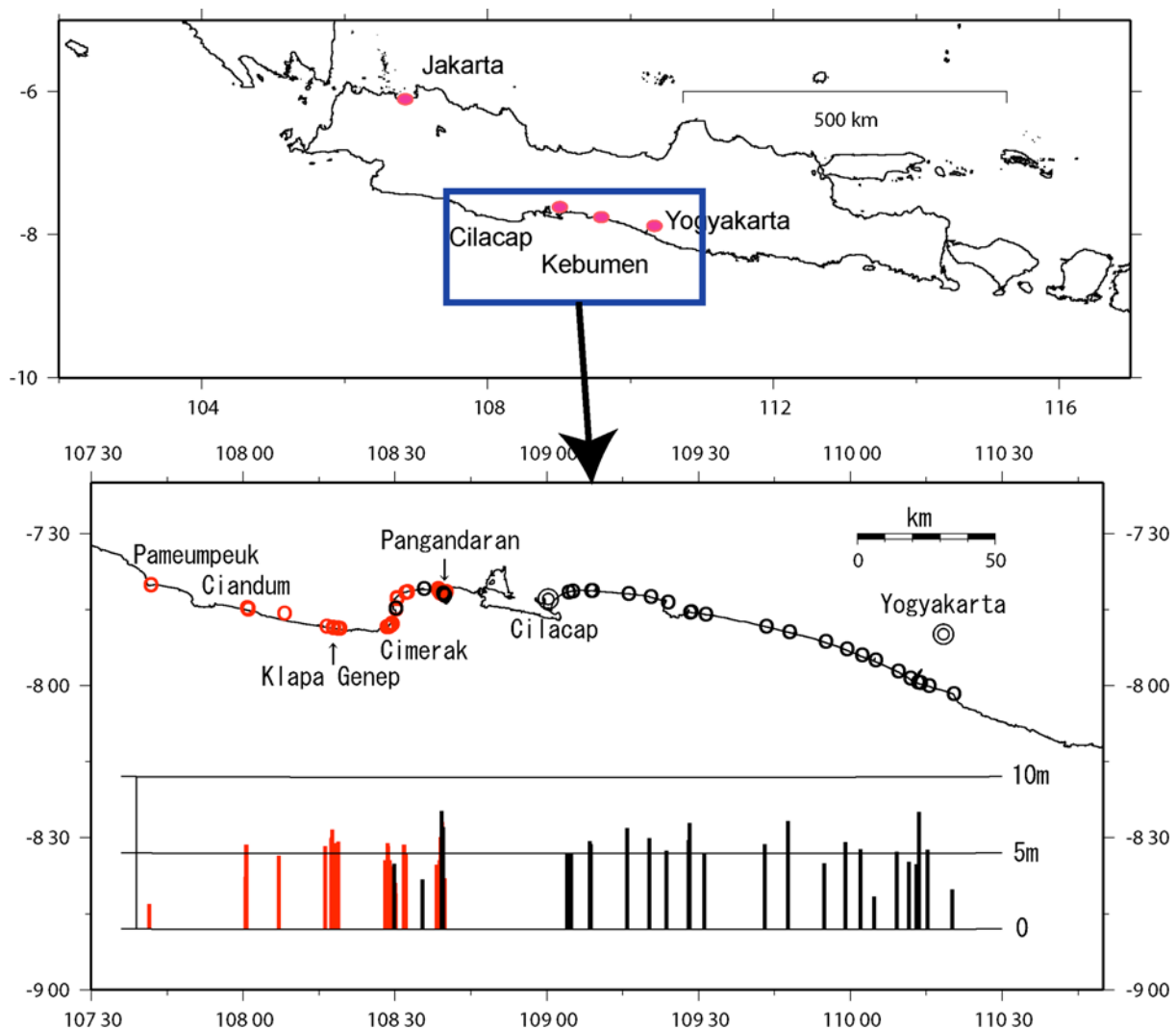
Post-Tsunami Survey, 4-11 August 2006, BMG, U/Tokyo, Kitvalley

Tsunami Run up after Mean Sea Level correction. Survey by Badan Meteorologidan Geofisika (BMG), Indonesia (Fachrizal, Indra Gunawan), Earthquake Research Institute-University of Tokyo (ERI), Japan (Yoshinobu Tsuji), Korea Institute of Earthquake Information (Kitvalley), Korea (She-Sub, Han). Red color indicates tsunami run up measured by BMG team, black color indicates tsunami run up measured by BMG team, ERI and Kitvalley.

Reference: Fachrizal, Sugeng Priyadi, and Iwan Hermawan, 2006, Laporan Survey Gempabumidan Tsunami Selatan Jawa Barat 17 Juli 2006, Badan Meteorologidan Geofisika, pp.77.

More detailed post-tsunami survey information can be accessed at:

http://www.eri.u-tokyo.ac.jp/tsunami/javasurvey/index_e.htm



Post-Tsunami Survey 20-21 July 2006, ITB-Kyoto Univ, posted by J. Mori, 27 Jul 2006

Source: <http://www.eqh.dpri.kyoto-u.ac.jp/~mori/java/java-tsunami.html>

Report on 24 July 2006:

On July 20 and 21, we inspected the damage area of the tsunami caused by the earthquake (M7.7) offshore of Java on July 17. There was severe damage and over 200 people killed in the Pangandaran area. The largest tsunamis probably occurred in the Bulakbenda area about 20 km to the southwest of Pangandaran. Throughout the region, we saw no damage due to earthquake shaking, and people felt the earthquake only very slightly



Pangandaran



Pangandaran



Marsawah village.

There is one building standing in this area, all the rest have been completely destroyed. 70 people were killed in this area.



Batu Hiu

**Post-Tsunami Survey, Nusa Kambangan, ~August 5-10, 2006, ITB, Univ. of Crete,
Georgia Institute of Technology, pers. comm. by H. Fritz to L. Kong 14 Aug 2006**

An international team surveyed Nusa Kambangan and reported up to 20 m runups on this sparsely populated island. 19 deaths were reported.

