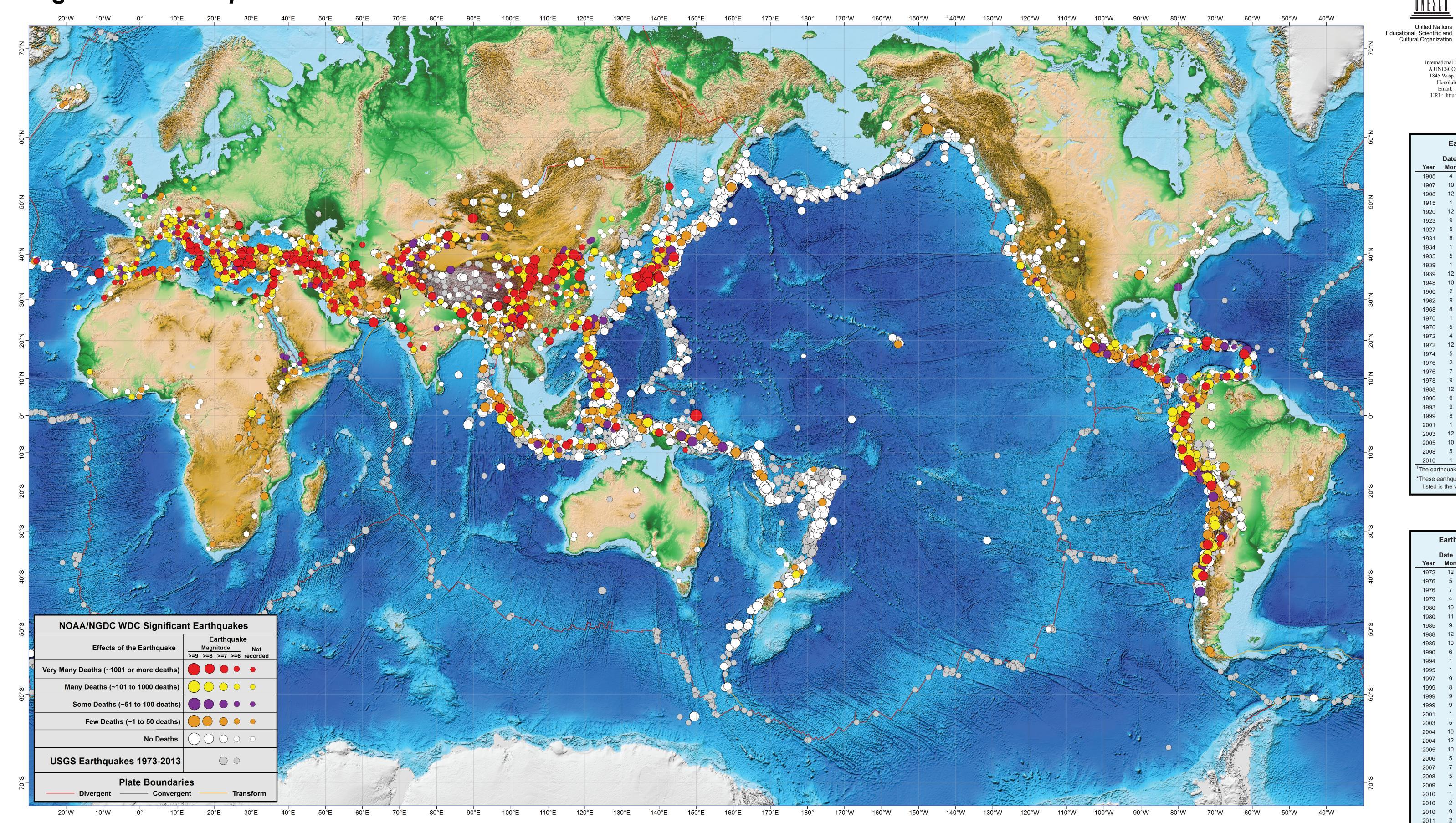
Significant Earthquakes 2150 B.C. to A.D. 2013



NOAA's National Geophysical Data Center (NGDC) and co-located World Data Center (WDC) for Geophysics and Marine Geology and the International Tsunami Information Center (ITIC), a UNESCO/IOC-NOAA partnership, have collaborated to produce a map showing significant earthquakes. The information comes from the NGDC Significant Earthquake Database that includes information on destructive earthquakes from 2150 B.C. to A.D. 2013 meeting at least one of the following criteria: resulted in moderate damage (approximately USD \$1 million or more), caused 10 or more deaths, registered a magnitude 7.5 or greater, assigned a Modified Mercalli Intensity X or greater, or generated a tsunami.

There are currently more than 5,700 earthquakes in the database. The global distribution of these earthquakes is 18% Europe, 17% East Asia, 15% Central and South Pacific, 14% Middle East, 10% South America, 8% North America and Hawaii, 5% Central Asia and the Caucasus, 5% Central America and the Caribbean, 3% Southern Asia, 3% Africa, and 2% Kamchatka and the Kuril Islands. This distribution partially reflects the documented history of a region. Prior to the invention of the seismograph in the late 1800s, the record of earthquakes is limited to historical accounts which are heavily dependent on settlement and written records.

The total number of deaths from earthquakes is almost 8 billion and the total damage is over USD \$760 billion. These numbers are probably underestimates, however, since the actual numbers are unknown for many events. Tables 1 and 2 list the most deadly and damaging earthquakes since 1900. The top twelve earthquakes based on magnitude since 1900 are summarized in Table 3; all but one generated tsunamis and caused damage.

The events in the NGDC Significant Earthquake Database were gathered from the U.S. Geological Survey, earthquake catalogs, national and government databases and reports, post-event reconnaissance reports, journal articles,

newspapers, internet sources, email, and other written documents. For a complete listing of references used to compile the database, please visit: http://www.ngdc.noaa.gov/hazard/

Circles on the map represent the location, magnitude, and number of deaths for significant earthquakes. Gray circles represent all earthquakes since 1973 with M6 ≤ magnitude < M7.5 that did not cause death or damage based on the U.S. Geological Survey (USGS) Preliminary Determination of Epicenters catalog.

The data in the NGDC Significant Earthquake Database are continually being updated and reviewed for accuracy. Please contact NGDC (paula.dunbar@noaa.gov) or ITIC (laura.kong@noaa.gov) with any changes, additions, or comments.

References:

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	Date			Magnitude		*Damag	
Year	Mon	Day	Location	MS or Mw	Deaths	\$USD millio	
1905	4	4	Kangra, India	7.8	19,000		
1907	10	21	Karatag, Tajikistan	7.4	12,000		
1908	12	28	Messina, Italy ^T	7.1	82,000	1	
1915	1	13	Avezzano, Italy	7.5	29,978	(
1920	12	16	Gansu, China	7.8	200,000	2	
1923	9	1	Kanto, Japan ^T	7.9	142,807	6	
1927	5	22	Gansu, China	7.6	40,912		
1931	8	10	Xinjiang, China	8.0	10,000		
1934	1	15	Bihar, India	8.0	10,600		
1935	5	30	Quetta, Pakistan	7.5	60,000	:	
1939	1	25	Chillan, Chile	8.3	30,000	9:	
1939	12	26	Erzincan, Turkey ^T	7.7	32,700		
1948	10	5	Ashkhabad, Turkmenistan	7.3	110,000		
1960	2	29	Agadir, Morocco	5.9	13,100	1:	
1962	9	1	Buyin-Zahra, Iran	7.2	12,225		
1968	8	31	Dasht-e-Bayaz, Iran	7.3	10,488		
1970	1	4	Yunnan Province, China	7.8	10,000		
1970	5	31	Northern Peru ^T	7.9	66,794	5	
1972	4	10	Qir, Iran	6.9	30,000		
1972	12	23	Managua, Nicaragua	6.2	10,000	2,9	
1974	5	10	Yunnan, Sichuan, China	7.1	20,000		
1976	2	4	Chimaltenango, Guatemala ^T	7.5	23,000	2,1	
1976	7	27	Tanghsan, China	7.5	242,769	5,6	
1978	9	16	Tabas, Iran	7.8	20,000		
1988	12	7	Spitak, Armenia	6.8	25,000	16,2	
1990	6	20	Rasht, Iran	7.7	50,000	8,0	
1993	9	29	Latur, India	6.2	11,000	3	
1999	8	17	Kocaeli, Turkey ^T	7.6	17,118	20,0	
2001	1	26	Gujarat, India	7.7	20,005	2,6	
2003	12	26	Bam, Iran	6.6	31,000		
2005	10	8	Kashmir, Pakistan	7.6	86,000	5,2	
2008	5	12	Sichuan, China	7.9	87,652	86,0	
2010	1	12	Port-au-Prince, Haiti ^T	7.0	316,000	8,0	

Table 2

v	Date	_	Landlan	Magnitude	Deaths	*Damaç
Year	Mon	Day	Location	MS or Mw	Deaths	\$USD millio
1972	12	23	Managua, Nicaragua	6.2	10,000	2,90
1976	5	6	Friuli, Italy	6.5	978	3,6
1976	7	27	Tangshan, China	7.5	242,769	7,00
1979	4	15	Montenegro ^T	6.9	131	2,70
1980	10	10	El Asnam, Algeria ^T	7.7	5,000	5,20
1980	11	23	Southern Italy	6.9	4,689	20,00
1985	9	19	Michoacan, Mexico ^T	8.1	9,500	4,00
1988	12	7	Spitak, Armenia	6.8	25,000	16,20
1989	10	18	Loma Prieta, California, USA ^T	6.9	62	5,60
1990	6	20	Rasht, Iran	7.7	50,000	8,00
1994	1	17	Northridge, California, USA ^T	6.7	60	40,00
1995	1	16	Southern Honshu, Japan ^T	6.9	5,502	100,00
1997	9	26	Central Italy	6.0	14	4,52
1999	8	17 -	Kocaeli, Turkey ^T	7.6	17,118	20,00
1999	9	7	Athens, Greece	6.0	143	4,20
1999	9	20	Chi-Chi, Taiwan	7.7	2,297	14,0
2001	1	26	Gujarat, India	7.7	20,005	2,62
2003	5	21	Northern Algeria ^T	6.8	2,266	5,00
2004	10	23	Honshu, Japan	6.6	40	28,00
2004	12	26	Banda Aceh, Indonesia ^T	9.1	1,000	**10,00
2005	10	8	Kashmir, Pakistan	7.6	8,600	5,20
2006	5 -	26	Java, Indonesia	6.3	5,749	3,10
2007	7	16	Honshu, Japan [™]	6.6	9	12,50
2008	5	12	Sichuan, China	7.9	87,652	86,00
2009	4	6	L'Aquila, Italy	6.3	295	2,50
2010	1	12	Port-au-Prince, Haiti ^T	7.0	316,000	8,00
2010	2	27	Maule, Chile ^T	8.8	365	**30,0
2010	9	3	Christchurch, New Zealand	7.0		6,5
2011	2	21	Christchurch, New Zealand	6.1	181	15,0
2001	3	11	Honshu, Japan [™]	9.0	1,400	**210,0
2011	6	13	Christchurch, New Zealand	6.0	1	3,0
2012	5	29	Emilia Romagna, Italy	5.9	7	15,80

Earthquake and tsunami effects could not be separated, but the majority of the damage was from

Date				Magnitude	Deaths			**Damage (\$USD million)			
Year	Mon	Day	Location	Mw	Earthquake	Tsunami	Total	Earthquake	Tsunami	Total	
1906	1	31	Northern Ecuador ^T	8.6	*1,000	*1,000	*1,000				
1950	8	15	Assam, India	8.6	1530		1530	20		20	
1952	11	4	Kamchatka, Russia ^T	9.0	0	4,000	4,000		1	1	
1957	3	9	Andreanof Islands, Alaska, USA ^T	8.6	0	0	0				
1960	5	22	Central Chile ^T	9.5	1,000	1,222	2,222	*1,000	*1,000	*1,000	
1964	3	28	Prince William Sound, Alaska, USA ^T	9.2	15	124	139	*1,020	*1,020	*1,020	
1965	2	4	Andreanof Islands, Alaska, USA ^T	8.7	0	0	0				
2004	12	26	Banda Aceh, Indonesia ^T	9.1	1,000	226,898	227,898	*10,000	*10,000	*10,000	
2005	3	28	Nias, Indonesia ^T	8.6	1,303	10	1,313				
2010	2	27	Maule, Chile ^T	8.8	365	156	521	*30,000	*30,000	*30,000	
2011	3	11	Honshu, Japan ^T	9.0	1,400	17,150	18,550	*210,000	*210000	*210,000	
2012	4	11	Sumatra, Indonesia ^T	8.6	10	0	10				

hese earthquakes all caused damage, but the dollar amount is not always available. The amount listed is the value at the time of the event.