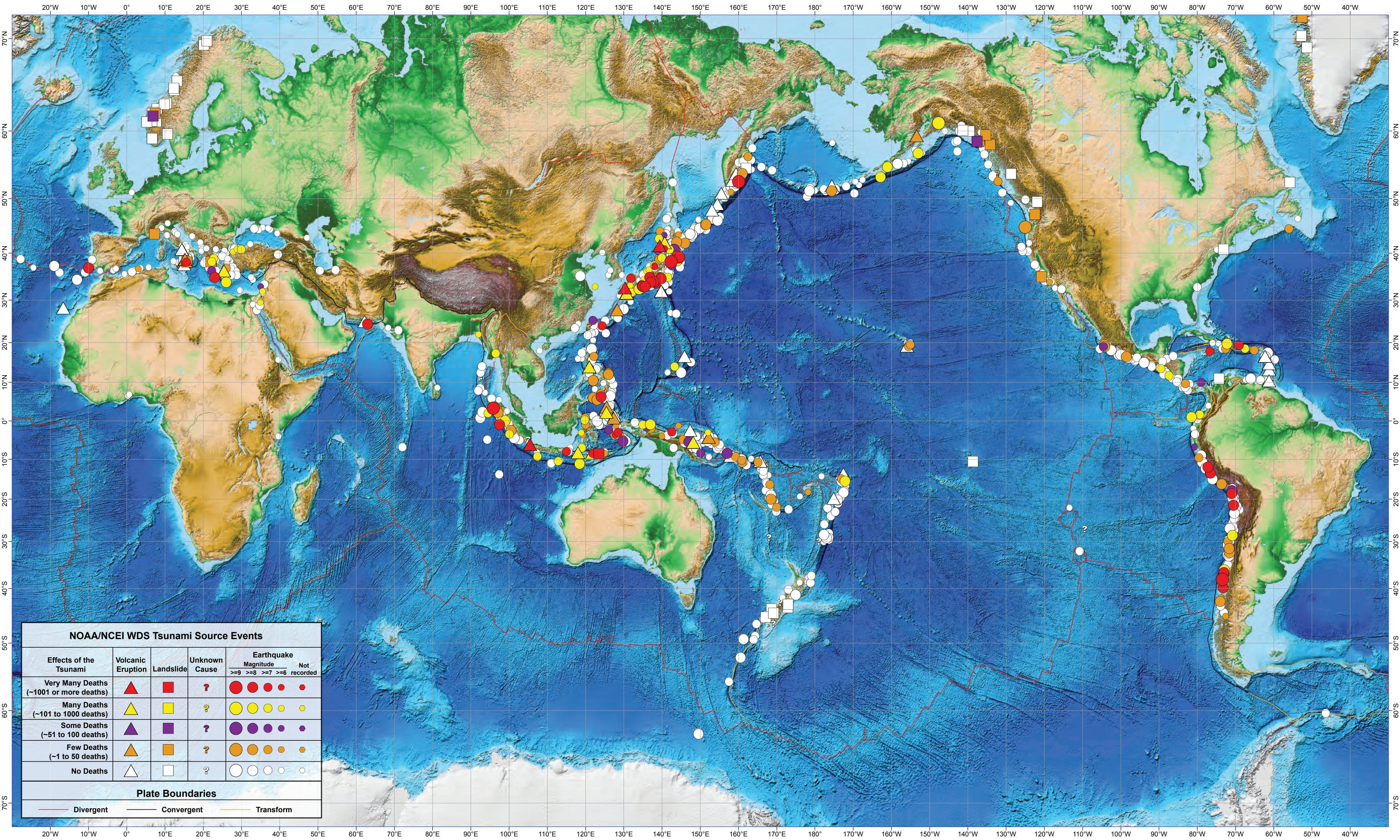


# Tsunami Sources 1610 B.C. to A.D. 2017

from Earthquakes, Volcanic Eruptions, Landslides, and Other Causes





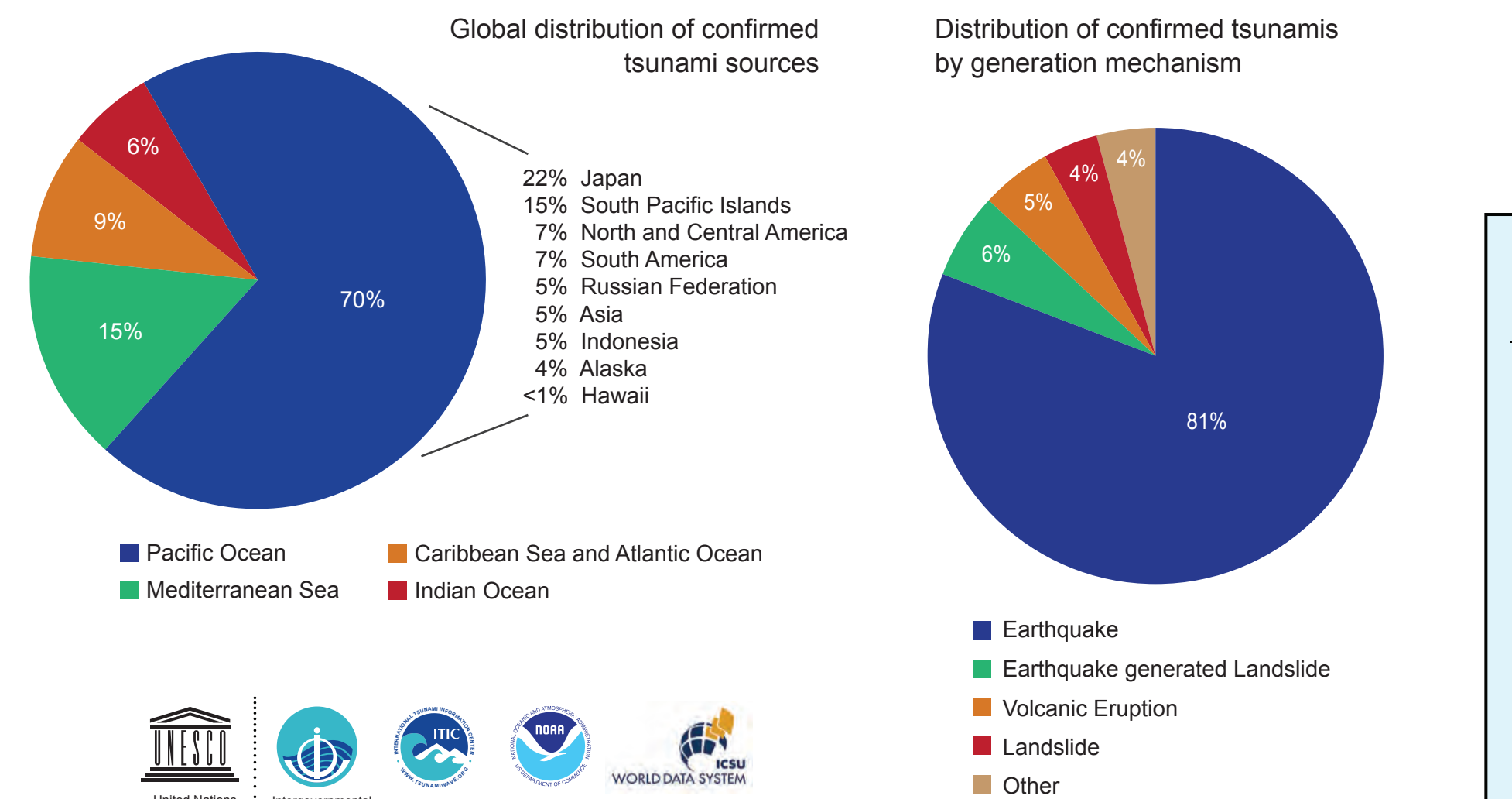
NOAA’s National Centers for Environmental Information (NCEI) and co-located World Data Service (WDS) for Geophysics and the International Tsunami Information Center (ITIC), a UNESCO/IOC-NOAA partnership, have collaborated to produce a map showing tsunami sources. The information comes from the NCEI Global Historical Tsunami Database that includes information on tsunami source events throughout the world that range in date from 1610 B.C. to A.D. 2017. The tsunami definitions are from the Tsunami Glossary 2016 published by UNESCO IOC.

Of the 2,500 events in the NCEI Global Historical Tsunami Database, over 1,200 confirmed tsunami source events are displayed on the map. A total of 252 confirmed deadly tsunamis have resulted in over 540,000 known (or confirmed) deaths. The death total may include deaths from the generating event (e.g., earthquake) as it is not always possible to separate deaths from the different causes. These figures should be much higher, but in many events the actual number of fatalities is not known. The reporting of deadly tsunamis is not homogeneous in space or time, particularly for periods prior to the 1900s.

Tsunamis are also classified by how far away the effects of the waves were observed. For example, the effects of a local tsunami are confined to coasts within about 100 km (62 miles) or less than 1 hour tsunami travel time from its source. A tsunami capable of destruction within 1,000 km (621 miles) or 1-3 hours travel time from its source is considered a regional tsunami. Most destructive tsunamis can be classified as local or regional. It follows that many tsunami-related deaths and considerable property damage result from these tsunamis (Table 1). In fact, 90% of all tsunami deaths in the historic record occurred in the local or regional area within the first 3 hours of the event. Between 1980 and 2017 there were 34 local or regional confirmed tsunamis that resulted in deaths and property damage (Table 2); 24 of these were in the Pacific and its adjacent seas.

A distant or teletsunami is a tsunami originating from a far away source, generally more than 1,000 km (621 miles) or more than 3 hours tsunami travel time away. They usually start as a local tsunami that causes extensive destruction near the source; the waves then continue to travel across the entire ocean basin with sufficient energy to cause additional deaths and destruction on distant shores. In the last 300 years, there have been at least 43 confirmed damaging teletsunamis and 18 caused deaths more than 1,000 km (621 miles) from the source (Table 3).

The events in the NCEI Global Historical Tsunami Database were gathered from the NOAA Tsunami Warning Centers, NOAA National Data Buoy Center, NOAA National Ocean Service, UNESCO/IOC-NOAA International Tsunami Information Center, NOAA Pacific Marine Environmental Laboratory, U.S. Geological Survey, national and government databases and reports, tsunami catalogs, post-event reconnaissance reports, journal articles, newspapers, internet sources, email, and other written documents. This compilation does not include sources inferred from the study of tsunami deposits. Tsunami deposits are the physical evidence left behind when a tsunami impacts a shoreline or affects submarine sediments. For a complete listing of references used in compiling the database, please visit: <http://www.ngdc.noaa.gov/hazard/>.



International Tsunami Information Center  
A UNESCO/IOC - NOAA Partnership  
1845 Wasp Boulevard, Building 176  
Honolulu, Hawaii 96818, USA  
Tel: 1-808-725-6050, Fax: 1-808-725-6055  
Email: [laura.kong@noaa.gov](mailto:laura.kong@noaa.gov)  
URL: <http://www.tsunamiwave.org>

National Centers for Environmental Information  
World Data Service for Geophysics  
325 Broadway  
Boulder, CO 80305-3328, USA  
Tel: 1-303-497-3158, Fax: 1-303-497-6513  
Email: [nicolas.arcos@noaa.gov](mailto:nicolas.arcos@noaa.gov)  
URL: <http://www.ngdc.noaa.gov/hazard/>

| Table 1. Regional and local tsunamis causing 2,000 or more deaths |     |     |                          |                           |  |
|---|-----|-----|--------------------------|---------------------------|--|
| Date  |     |     | Source Location          | Estimated Dead or Missing |  |
| Year  | Mon | Day |                          |                           |  |
| 365   | 7   | 21  | Crete, Greece            | 5,000                     |  |
| 887   | 8   | 2   | Niigata, Japan           | 2,000                     |  |
| 1341  | 10  | 31  | Aomori Prefecture, Japan | 2,600                     |  |
| 1498  | 9   | 20  | Enshunada Sea, Japan     | 5,000                     |  |
| 1570  | 2   | 8   | Central Chile            | 2,000                     |  |
| 1605  | 2   | 3   | Nankaido, Japan          | 5,000                     |  |
| 1611  | 12  | 2   | Sanriku, Japan           | 5,000                     |  |
| 1674  | 2   | 17  | Banda Sea, Indonesia     | 2,244                     |  |
| 1687  | 10  | 20  | Southern Peru            | *5,000                    |  |
| 1692  | 6   | 7   | Port Royal, Jamaica      | 2,000                     |  |
| 1703  | 12  | 30  | Boso Peninsula, Japan    | *5,233                    |  |
| 1707  | 10  | 28  | Enshunada Sea, Japan     | 2,000                     |  |
| 1707  | 10  | 28  | Nankaido, Japan          | *5,000                    |  |
| 1741  | 8   | 29  | Hokkaido, Japan          | 2,000                     |  |
| 1746  | 10  | 29  | Central Peru             | 4,800                     |  |
| 1751  | 5   | 20  | Northwest Honshu, Japan  | 2,100                     |  |
| 1755  | 11  | 1   | Lisbon, Portugal         | *50,000                   |  |
| 1771  | 4   | 24  | Ryukyu Islands, Japan    | 13,486                    |  |
| 1792  | 5   | 21  | Kyushu Island, Japan**   | 14,524                    |  |
| 1854  | 12  | 24  | Nankaido, Japan          | *3,000                    |  |
| 1868  | 8   | 13  | Northern Chile*          | 25,000                    |  |
| 1877  | 5   | 10  | Northern Chile           | 2,282                     |  |
| 1883  | 8   | 27  | Krakatau, Indonesia**    | 34,417                    |  |
| 1896  | 6   | 15  | Sanriku, Japan           | *27,122                   |  |
| 1899  | 9   | 29  | Banda Sea, Indonesia     | *2,460                    |  |
| 1908  | 12  | 28  | Messina Strait, Italy    | 2,000                     |  |
| 1923  | 9   | 1   | Sagami Bay, Japan        | 2,144                     |  |
| 1933  | 3   | 2   | Sanriku, Japan           | 3,022                     |  |
| 1945  | 11  | 27  | Makran Coast, Pakistan   | *4,000                    |  |
| 1952  | 11  | 4   | Kamchatka, Russia        | 10,000                    |  |
| 1960  | 5   | 22  | Southern Chile           | 2,000                     |  |
| 1976  | 8   | 16  | Moro Gulf, Philippines   | 6,800                     |  |
| 2004  | 12  | 26  | Banda Aceh, Indonesia    | *^227,899                 |  |
| 2011  | 3   | 11  | Tohoku, Japan            | *^18,453                  |  |
| Total   |     |     |                          | 505,586                   |  |
| * May include earthquake deaths                                   |     |     |                          |                           |  |
| ** Tsunami generated by volcanic eruption                         |     |     |                          |                           |  |
| ^ Includes dead/mising near and outside source region             |     |     |                          |                           |  |

| Table 2. Regional and local tsunamis causing deaths since 1980 |     |     |                         |                           |  |
|--|-----|-----|-------------------------|---------------------------|--|
| Date   |     |     | Source Location         | Estimated Dead or Missing |  |
| Year   | Mon | Day |                         |                           |  |
| 1981   | 9   | 1   | Samoa Islands           | Few                       |  |
| 1983   | 5   | 26  | Noshiro, Japan          | 100                       |  |
| 1988   | 8   | 10  | Solomon Islands         | 1                         |  |
| 1991   | 4   | 22  | Limon, Costa Rica       | 2                         |  |
| 1992   | 9   | 2   | Off coast Nicaragua     | 170                       |  |
| 1992   | 12  | 12  | Flores Sea, Indonesia   | 1,169                     |  |
| 1993   | 7   | 12  | Sea of Japan            | 208                       |  |
| 1994   | 6   | 2   | Java, Indonesia         | 238                       |  |
| 1994   | 10  | 8   | Halmahera, Indonesia    | 1                         |  |
| 1994   | 11  | 4   | Skagway Alaska, USA**   | 1                         |  |
| 1994   | 11  | 14  | Philippine Islands      | *81                       |  |
| 1995   | 5   | 14  | Timor, Indonesia        | 11                        |  |
| 1995   | 10  | 9   | Manzanillo, Mexico      | 1                         |  |
| 1996   | 1   | 1   | Sulawesi, Indonesia     | 9                         |  |
| 1996   | 2   | 17  | Irian Jaya, Indonesia   | 110                       |  |
| 1996   | 2   | 21  | Northern Peru           | 12                        |  |
| 1998   | 7   | 17  | Papua New Guinea        | 1,636                     |  |
| 1999   | 8   | 17  | Izmit Bay, Turkey       | 155                       |  |
| 1999   | 11  | 26  | Vanuatu Islands         | 5                         |  |
| 2001   | 6   | 23  | Southern Peru           | 26                        |  |
| 2004   | 12  | 26  | Banda Aceh, Indonesia   | **227,899                 |  |
| 2006   | 3   | 14  | Seram Island, Indonesia | 4                         |  |
| 2006   | 7   | 17  | Java, Indonesia         | 802                       |  |
| 2007   | 4   | 1   | Solomon Islands         | 50                        |  |
| 2007   | 4   | 21  | Southern Chile          | 8                         |  |
| 2007   | 8   | 15  | Southern Peru           | 3                         |  |
| 2009   | 9   | 29  | Samoa Islands           | 192                       |  |
| 2010   | 1   | 12  | Haiti                   | 7                         |  |
| 2010   | 2   | 27  | Southern Chile          | 156                       |  |
| 2010   | 10  | 25  | Mentawai, Indonesia     | 431                       |  |
| 2011   | 3   | 11  | Tohoku, Japan           | *^18,453                  |  |
| 2013   | 2   | 6   | Solomon Islands         | 10                        |  |
| 2015   | 9   | 16  | Central Chile           | 8                         |  |
| 2017   | 6   | 17  | Greenland**             | 4                         |  |
| Total  |     |     |                         | 251,959                   |  |
| * May include earthquake deaths                                |     |     |                         |                           |  |
| ** Tsunami generated by landslide                              |     |     |                         |                           |  |
| ^ Includes dead/missing near and outside source region         |     |     |                         |                           |  |

| Table 3. Tsunamis causing deaths greater than 1000 km from the source location |     |     |   |                           |   |  |  |
|--|-----|-----|---|---------------------------|---|--|--|
| Date   |     |     | Source Location                               | Estimated Dead or Missing |   | Distant locations that reported casualties   |  |
| Year   | Mon | Day |   | Local                     | Distant   |  |  |
| 1700   | 1   | 27  | Cascadia Subduction Zone, USA                 |                           | 2   | Japan  |  |
| 1755   | 11  | 1   | Lisbon, Portugal                              | 50,000                    | 3   | Brazil   |  |
| 1837   | 11  | 7   | Southern Chile                                | 0                         | 16  | USA (Hawaii)   |  |
| 1868   | 8   | 13  | Northern Chile**                              | *25,000                   | 7   | New Zealand, Samoa, Southern Chile   |  |
| 1877   | 5   | 10  | Northern Chile                                | 277                       | 2,005   | Fiji, Japan, Peru, USA (Hawaii)  |  |
| 1883   | 8   | 27  | Krakatau, Indonesia                           | 34,417                    | 1   | Sri Lanka  |  |
| 1899   | 1   | 15  | Papua New Guinea                              | 0                         | Hundreds  | Caroline Islands, Solomon Islands  |  |
| 1901   | 8   | 9   | Loyalty Islands, New Caledonia                | 0                         | Several   | Santa Cruz Islands   |  |
| 1923   | 2   | 3   | Kamchatka, Russia                             | 2                         | 1   | USA (Hawaii)   |  |
| 1945   | 11  | 27  | Makran coast, Pakistan                        | *4,000                    | 11  | India  |  |
| 1946   | 4   | 1   | Unimak Island, Alaska, USA                    | 5                         | 162   | Marquesas Is, Peru, USA (California, Hawaii)   |  |
| 1957   | 3   | 9   | Andreanof Islands, Alaska, USA                | 0                         | 2   | USA (Hawaii, indirect deaths from plane crash doing tsunami reconnaissance)  |  |
| 1960   | 5   | 22  | Central Chile                                 | 2,000                     | 226   | Japan, Philippines, USA (California, Hawaii)   |  |
| 1964   | 3   | 28  | Prince William Sound, Alaska, USA             | 106                       | 18  | USA (California, Oregon)   |  |
| 2004   | 12  | 26  | Banda Aceh, Indonesia***                      | *175,827                  | 52,072  | Bangladesh, India, Kenya, Madagascar, Maldives, Myanmar, Seychelles, Somalia, South Africa, Sri Lanka, Tanzania, Yemen |  |
| 2005   | 3   | 28  | Sumatra, Indonesia                            | 0                         | 10  | Sri Lanka (deaths during evacuation)   |  |
| 2011   | 3   | 11  | Tohoku, Japan                                 | *18,451                   | 2   | Indonesia, USA (California)  |  |
| 2012   | 10  | 28  | Haida Gwaii, Canada                           | 0                         | 1   | USA (Hawaii, death during evacuation)  |  |
| *May include earthquake deaths   |     |     | **Local and regional deaths in Chile and Peru |                           | ***Local and regional deaths in Indonesia, Malaysia, and Thailand |  |  |