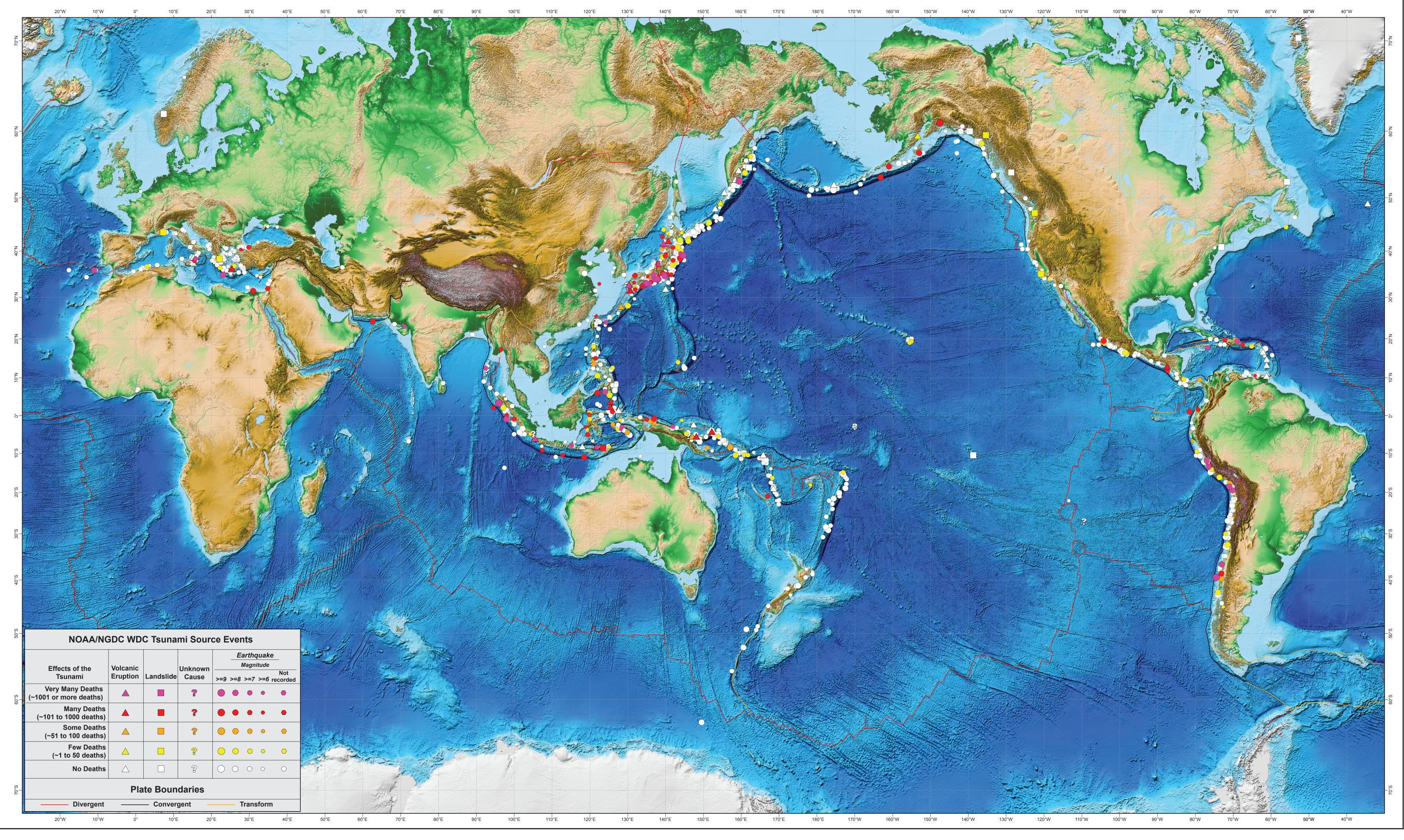
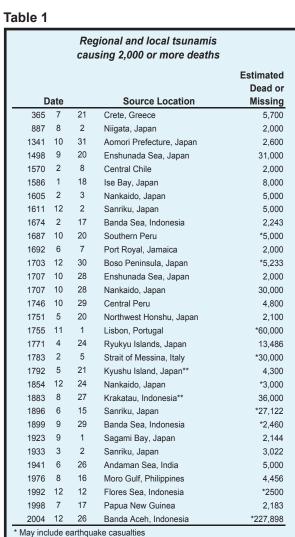
## Global Tsunami Sources 1650 B.C. to A.D. 2008 from Earthquake, Volcano, Landslide, and Other Causes





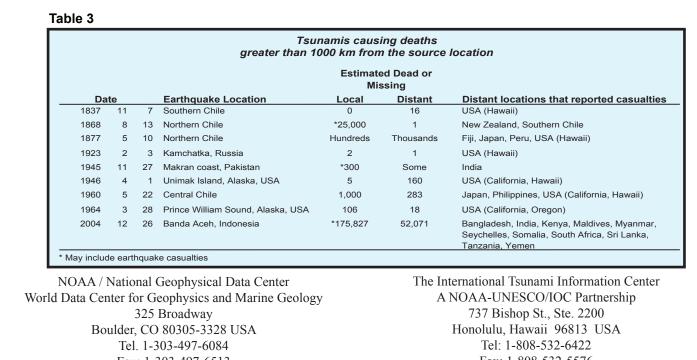
Tsunami generated by volcanic eruption

NOAA's National Geophysical Data Center (NGDC) and co-located World Data Center (WDC) for Geophysics and Marine Geology, Boulder and the International Tsunami Information Center (ITIC), a NOAA-UNESCO/IOC Partnership, have collaborated to produce a map showing tsunami sources. These data are from the NGDC global historical tsunami database that includes information on tsunami source events throughout the world that range in date from 1650 B.C. to A.D. 2008. The tsunami definitions are from the Tsunami Glossary 2008 published by UNESCO.

Of the 2,000 events in the NGDC tsunami database, over 1,100 confirmed tsunami source events are displayed on the map. The global distribution of these tsunami sources is 73% Pacific Ocean, 14% Mediterranean Sea, 6% Caribbean Sea and Atlantic Ocean, 5% Indian Ocean, and 2% Black Sea. Most of these tsunamis were generated by earthquakes (83%) or earthquakes that caused landslides (6%). The remaining events were caused by landslides (2%), volcanic eruptions (6%), and unknown sources (3%).

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 or less than 1 hour tsunami travel time from its source. A tsunami capable of destruction within 1,000 km 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 casualties and considerable property damage result from these tsunamis (Table 1). Between 1975 and 2007 there were 34 local or regional tsunamis that resulted in deaths and property damage (Table 2); 23 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 or more than three 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



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Printed by the Chilean Navy Hydrographic and Oceanographic Service (SHOA)

cause additional casualties and destruction on distant shores. In the last 200 years, there have been at least 26 destructive teletsunamis and nine caused fatalities more than 1,000 km from the source (Table 3).

The events in the NGDC tsunami database were gathered from the NOAA Tsunami Warning Centers, NOAA National Data Buoy Center, NOAA National Ocean Service, UNESCO IOC 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 pages, 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 historical tsunami database, please see the NGDC website: http://www.ngdc.noaa.gov/hazard/tsu.shtml.

The data in the NGDC tsunami database are continually being updated and reviewed for accuracy. Please contact NGDC (paula.dunbar@noaa.gov) or ITIC (l.kong@unesco.org) with any changes, additions, or com-

## References:

Intergovernmental Oceanographic Commission (IOC). 2008. Tsunami Glossary, 2008. Paris, United Nations Educational, Scientific, and Cultural Organization (UNESCO). IOC Technical Series, 85. (English)

Plate boundaries from the Plates Project: http://www.ig.utexas.edu/research/projects/plates/index.htm#data

Topography/Bathymetry from Amante, C. and B. W. Eakins. 2008. ETOPO1 1 Arc-Minute Global Relief Model: Procedures, Data Sources and Analysis. National Geophysical Data Center, NESDIS, NOAA, U.S. Department of Commerce, Boulder, CO, August

