1964 M=9.2 earthquake in the Gulf of Alaska. The May 22, 1960 Chile earthquake generated a 35 foot wave causing 61 deaths and $23 million in damage. Other significant tsunamis in Hawaii include: 1952 (M=9.0) Kamchatka, USSR earthquake ($1 million damage), 1957 (M=9.1) Aleutian Islands earthquake ($5 million damage).

Local tsunamis have also hit Hawai'i, primarily from earthquakes and large-scale subsidence along the south flank of Kiluea. The largest of these were in 1868 that killed 81 people and in 1975. Overall, approximately 32 tsunamis with runup > 1 meter have occured in Hawai'i since 1811.

Alaska

Because Alaska, including the Aleutian Islands, is bordered to the south by a major subduction zone capable of generating large earthquakes, Alaska has experienced a number of damaging tsunamis. Two megathrusts have ruptured in great earthquakes: the Aleutian and Alaskan subduction zones. The Aleutian subduction zone ruptured segments in 1957 (M=9.1), 1965 (M=8.7), and 1986 (M =8.0). The Alaskan subduction zone ruptured in 1938 (M=8.2), 1946 (M=7.3), 1948 (M=7.5), and 1964 (M=9.2). By far, the one that stands out is the tsunami generated from the 1964 M=9.2 earthquake that occurred in the Gulf of Alaska. Not only was a Pacific-wide tsunami generated from this great earthquake, but landslides in the coastal fjords such as Valdez also generated localized, but extremely damaging waves. The 1964 tsunami caused damage and loss of life across the Pacific. The West Coast & Alaska Tsunami Warning Center, Palmer Alaska indicates that the 1964 tsunami was the most disastrous tsunami to hit the U.S. West Coast. Many fatalities and financial losses were caused by with the tsunami: Alaska- 106 deaths and $84 million damage; Washington- minor damage along the coast; Oregon- 4 deaths and $0.7 million damage; California- 13 deaths and $10 million damage.

Alaska's famous fjords are also the source for another type of "tsunami": one in which landslides perched on the steep walls of fjords catastrophically fail and splash into the water, generating extreme wave heights, such as the 1958 Lituya Bay landslide. Again this is a localized phenomenon that does not produce teletsunamis as with tsunamis produced by great earthquakes. Overall, approximately 16 tsunamis of all sources with runup > 1 meter have occurred in Alaska since 1853.

U.S. West Coast

The historic record of tsunamis along the U.S. west coast includes mainly teletsunamis, generated from large earthquakes around the Pacific Rim. Nevertheless, potentially tsunamigenic fault structures do exist locally offshore the U.S. west coast, most noteably from the Cascadia subduction zone. The Cascadia subduction zone is a 750 miles (1,200 km) long offshore fault that extends from northern California to southern Canada and accommodates motion between the Pacific and North American plates at a rate of about 40 mm/yr (1.6 inches/year). This subduction zone is thought to have last ruptured in a M 9.0 earthquake in 1700; the resulting tsunami was recorded in northern Japan historical accounts. However, this fault has been quiescent since that large rupture. It has generated no great earthquakes (M>8) and very few large earthquakes (M>6) during the 150 years of recorded history. The 1992 Petrolia earthquake (M=7) is the largest modern event that is thought to have ruptured the plate interface. Geologic evidence of submerged vegetation indicates that large or great earthquakes (M=8-9) have occurred on average every 500 years along this zone. Great ruptures along this subduction zone would most likely cause local and possibly ocean-wide tsunamis that could affect the western United States.

Of the teletsunamis that have struck the West Coast, the 1964 Gulf of Alaska tsunami caused the most extensive damage, particularly in Crescent City, California. Overall, approximately 28 tsunamis with runup > 1 meter have occurred along the U.S. West Coast since 1812.

U.S. Gulf Coast

In historic times, tsunami waves recorded along the Gulf Coast have all been less than 1 meter. Some of the reports are from the 1964 Gulf of Alaska earthquake recorded in Louisiana and Texas and are technically termed a seiche. A **seiche** is an oscillation of a body of water, typically caused by atmospheric disturbances, but in this case caused by the ground motion from the earthquake. Seiches can also occur in lakes from earthquake movements. There are a couple of early 20th-centutry reports of tsunami waves from Caribbean earthquakes along the Gulf Coast that are difficult to evaluate, but the wave heights all appear to be less than 1 meter.

U.S. East Coast

Because the only major subduction zones in the Atlantic Ocean are along the Caribbean Sea, there has been a relatively low frequency of tsunamis compared to the Pacific Ocean. The most famous Atlantic tsunami is the 1755

Lisbon tsunami, that was generated by an earthquake on a fault offshore Portugal. The most noteworthy North America local tsunami is the 1929 M=7.3 Grand Banks earthquake near Newfoundland, Canada. This is a complex event; most, if not all, of the tsunami energy may have been triggered by a submarine landslide. The maximum tsunami runup from this event was 2-7 meters concentrated on the coast of Newfoundland, though it was recorded as far south as South Carolina. Like the Gulf Coast, there a couple of reports of small tsunamis from Caribbean earthquakes, all less than 1 meter.

Puerto Rico / U.S. Virgin Islands

Puerto Rico and the U.S. Virgin Islands are more susceptible than other locations in the eastern U.S., because of a subduction zone that lies beneath the Caribbean Sea, capable of generating large earthquakes. Tsunamis have impacted Puerto Rico and the Virgin Islands more than 6 times in recorded history. The web site of the Puerto Rico Tsunami Warning and Mitigation Program also asks whether a tsunami similar to the one in the Indian Ocean could hit the Caribbean region. An event in 1867 off the Virgin Islands is thought to have generated waves 12 meters high. The tsunami with the greatest amount of damage in Puerto Rico was in 1918 from an earthquake off the Mona Passage. With a maximum runup of 6 meters, the tsunami itself killed 40 people with an additional 76 people killed by the earthquake. The Caribbean region as a whole has a history of other earthquakes that have caused damaging tsunamis.

Other U.S. territories

Other territories of the United States are located adjacent to large subduction zones. Guam and Marianas Islands are located next to the Marianas trench. American Samoa is affected by earthquakes about 100 miles away along the Tonga-Kermadec trench.

References

These historic reports are based largely on the tsunami catalog maintained by the NGDC. Paper copies of the tsunami catalogs can be ordered from the publications web site. (See accompanying Copyright notice.) In addition we have used information from the Pacific Tsunami Warning Center (Hawaii and Alaska) and the Pacific Disaster Center.