Alaska Earthquake Information Center

Earthquake Monitoring Activities and Recent Seismicity Report
Alaska Seismic Hazard Safety Commission
Jamie Roush
September 18, 2007
Overview

- Monthly Seismicity Report
- Defining the Seismic Threat
- Earthquake Monitoring Network
- AEIC Education and Outreach Activities
- Seismology Lab Tour…
Alaska Seismicity
June 1 – August 31, 2007

- **5862** events located between June 1 and August 31
  - June: **1508**   July: **1854**   August: **2500**
  - 11 events in the range of magnitude 5.0 to 6.0
  - 52 events in the range of magnitude 4.0 to 5.0
  - 17 events were felt. No reports of damage.

- **Largest event:**

  **Magnitude 6.6** – August 2nd, 7:21 PM AKST, Andreanof Islands, 58 miles SE of Amchitka. Not felt. No damage reported.
AEIC Monthly Seismicity Report for August 01 - August 31, 2007

Alaska Earthquake Information Center
UAF Geophysical Institute
U.S. Geological Survey

* Volcano
- Depth <= 30
- 30 < Depth <= 75
- 75 < Depth <= 125
- Depth > 125

2500 events plotted
The Seismic Threat in Alaska

World's Largest Earthquakes

1. Chile 1960 9.5
2. Alaska 1964 9.2
3. Sumatra 2004 9.0
4. Kamchatka 1952 9.0
5. Ecuador 1906 8.8
6. Sumatra 2005 8.7
7. Alaska 1965 8.7
8. Alaska 1957 8.6
9. Assam-Tibet 1950 8.6
10. Kurile Islands 1963 8.5

• 75 % of N. American earthquakes annually
• 20,000 – 30,000 events per year
Earthquake Catalog 1898 – 2006

~250,000 Events
Pacific Plate Subduction and Earthquakes on the Aleutian Megathrust
Tectonic Setting

Right-lateral Strike Slip Faulting on the Plate Boundary
(Queen Charlotte-Fairweather Fault)
Historical Seismicity
Large Magnitude Earthquakes on the Aleutian Megathrust

Earthquakes in Alaska

Earthquake risk is high in much of the southern half of Alaska, but it is not the same everywhere. This map shows the overall geologic setting in Alaska that produces earthquakes. The Pacific plate is sliding northwesward past southeastern Alaska and then dives beneath the North American plate in southern Alaska, the Alaska Peninsula, and the Aleutian Islands. Most earthquakes are produced where these plates come into contact and slide past each other. Major earthquakes also occur throughout much of interior Alaska as a result of collision of a piece of crust with the southern margin.

This map is modified from "Earthquakes in Alaska" by Peter Haeussler and George Plafker, U.S. Geological Survey Open File Report 85-624.

Pre-1964 Earthquakes

Post-1964 Earthquakes

EQ Magnitudes (M)

- M 6.0 - 6.9
- M 7.0 - 7.9
- M 8.0 - 8.4
- M 8.5 - 8.9
- M 9.0 or larger

Earthquake rupture zone and date of most recent rupture

Active and potentially active faults

Speed and direction of Pacific plate movement by and under Alaska.

Three M 7 earthquakes occurred within 50 miles of Fairbanks in the last 90 years.

The Denali fault generated a M 9.2 earthquake in 2002. This part of the fault ruptured, with horizontal offset of up to 29 feet.

The 1964 earthquake was the second largest ever recorded in the world. The area within this yellow patch slipped seaward up to 66 feet.

The Queen Charlotte-Fairweather fault presents the greatest earthquake hazard to residents of southeast Alaska.
Historical Seismicity
Large Magnitude Earthquakes in Southeast Alaska

Earthquakes in Alaska

Earthquake risk is high in much of the southern half of Alaska, but it is not the same everywhere. This map shows the overall geologic setting in Alaska that produces earthquakes. The Pacific plate is sliding northward past southeastern Alaska and then dives beneath the North American plate in southern Alaska, the Alaska Peninsula, and the Aleutian Islands. Most earthquakes are produced where these plates come into contact and slide past each other. Major earthquakes also occur throughout much of interior Alaska as a result of collision of a piece of crust with the southern margin.


Pre-1964 Earthquakes
Post-1964 Earthquakes
EQ Magnitudes (M)
M 6.0 - 6.9
M 7.0 - 7.9
M 8.0 - 8.4
M 8.5 - 8.9
M 9.0 or larger

Earthquake rupture zone and date of most recent rupture
Active and potentially active faults
Speed and direction of Pacific plate movement by and under Alaska.

Three M 7.9 earthquakes occurred within 50 miles of Fairbanks in the last 90 years.
The Denali fault generated a M 7.9 earthquake in 2002. This part of the fault ruptured, with horizontal offset of up to 29 feet.

A Fault rupture in Cook Inlet resulted in a M 7.9 earthquake in 1993 that strongly shook Anchorage.

This piece of crust is being pushed into and beneath the southern Alaska margin. As a result it comes large earthquakes here and throughout interior Alaska.

The 1964 earthquake was the second largest ever recorded in the world.
The Queen Charlotte-Fairweather fault presents the greatest earthquake hazard to residents of southeast Alaska.
Earthquakes in Alaska

Earthquake risk is high in much of the southern half of Alaska, but it is not the same everywhere. This map shows the overall geologic setting in Alaska that produces earthquakes. The Pacific plate is sliding northwesterly past southeastern Alaska and then dives beneath the North American plate in southern Alaska, the Alaska Peninsula, and the Aleutian Islands. Most earthquakes are produced where these plates come into contact and slide past each other. Major earthquakes also occur throughout much of interior Alaska as a result of collision of a piece of crust with the southern margin.

Damage from the 2002 Denali Fault Earthquake
Seismic Monitoring Station Network

420+ Stations

Integrated network...
- AEIC
- AVO
- USGS
- WC/ATWC

Network expansion...
- Trans-Alaska Pipeline
- Gas Pipeline Corridor Project - DGGS
- STEEP/NSF
Seismic Monitoring Stations

Nikolski
Seismic Monitoring Stations

St. Paul
Seismic Monitoring Stations

Unalaska

Photo by D. Parrett
Seismic Monitoring Stations

Atka
Goat Mountain
STS2 Broadband Seismometer
STEEP
STEEP
AEIC Earthquake Response
Earthquake information releases are automatically distributed to local, state, and federal agencies and to the news media.

The public can view information releases on the AEIC web site:

www.aeic.alaska.edu

The public can submit “felt reports” by phone or on the web - they are invaluable!
AEIC Outreach and Education

Publications

• “Are You Prepared for the Next Big Earthquake in Alaska?” Earthquake Preparedness & Safety
• Tsunami Hazard Brochures with Evacuation Maps
• Other products being developed by ADHS&EM and AEIC with TWEAK funding…
  • General tsunami hazard brochures
  • Brochures for children
  • Promotional items to raise tsunami hazard awareness:
    • Magnets, posters, etc…
Public Contact

• Seismology lab tours for the public and school groups.

• Classroom presentations in Fairbanks area schools.

• Earthquake information booth at the Tanana Valley State Fair.

• Assist National Weather Service WC/ATWC with “Tsunami Ready” community outreach presentations in Alaska’s coastal communities.

• Assist the Geophysical Institute with the “Alaska Tsunami Education Program” (ATEP). K-12 science curriculum development.