V Examples of Earthquakes

Topic 14 Alaska—1964

OBJECTIVES

- **A** Identify movement along a subduction boundary as the cause of the 1964 Alaskan earthquake.
- **B** Discuss earthquake activity along the San Andreas fault system.
- **C** Explain the cause and significance of midplate earthquakes such as the 1811–1812 New Madrid earthquakes.

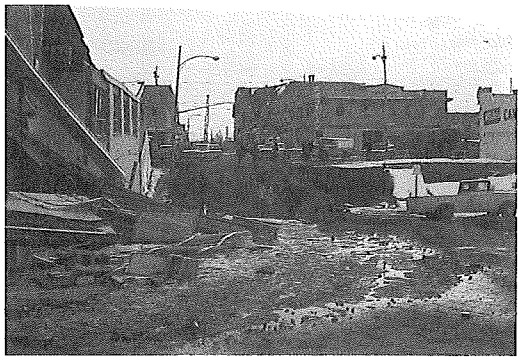
The Alaskan earthquake of 1964 had one of the largest magnitudes of any earthquake in this century. It began as a gentle rocking motion similar to the kind that Alaskans customarily experience. However, unlike the usual tremors that taper off, this one grew worse until the ground was rolling like huge ocean waves. The rolling continued for five minutes. By the time it ended, Alaska had experienced some frightening changes. Whole blocks of houses were moved, buildings collapsed, and huge fissures opened in the ground. More than 260 000 square kilometers of ground were heaved upward 2 meters and then dropped. Another 65 000 square kilometers were moved sideways.

The Alaskan earthquake was caused by movement along a subduction boundary. All along the Aleutian Islands, the Pacific Plate is pushing under the North American Plate. Some subduction boundaries move by long-term steady creep, so severe earthquakes are rare. The subduction of the Pacific Plate at the Mariana Islands is an example. Other subduction boundaries, however, move by horizontal slippage. This kind of slippage causes earthquakes. Both Alaska and Chile are located on such boundaries.

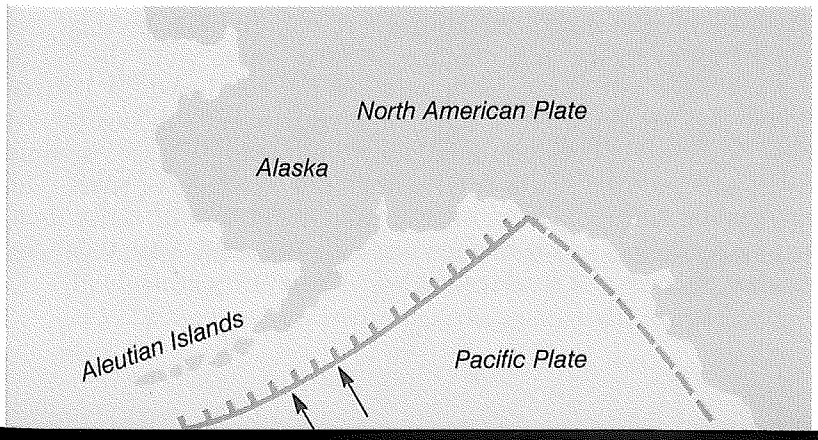
The main reason the Alaskan earthquake was so severe was that the break on the fault that started the earthquake triggered other breaks. In all, over 800 kilometers of fault plane were affected.

The earthquake was so strong that it caused buildings to shake as far away as Seattle, Washington. Even more surprising, many seismograph stations around the world were unable to record the earthquake because it threw tracking pens off their recording drums. Detectable vibrations were recorded for 18 months after the earthquake. Over 10 000 aftershocks were counted.

The earthquake, however, was just the beginning of the devastation. It generated a series of tsunamis, or seismic sea waves. Coastal villages were flooded again and again at intervals of about 30 minutes. One fishing village simply disappeared after a 21-meter wave swept over it. The waves crossed the Pacific Ocean at more than 600 kilometers per hour and caused severe damage as far away as Hawaii and Japan. Amazingly, only 115 people were killed.



15.12 Buildings in downtown Anchorage were severely damaged during the 1964 Alaskan earthquake.



15.13 This map shows the location of the plate boundary that caused the Alaskan earthquake.