SEISMOLOGY

Undersea Earthquake

The largest earthquake in two years occurred under the Pacific Ocean, and less than 36 hours later, another large quake shook beneath the Atlantic Ocean—By Barbara Tufty

➤ THE OCT. 17 UNDERSEA earthquake that took place in the Pacific Ocean, about 150 miles off the coast of Peru, was the largest earthquake anywhere in the world since the Alaskan earthquake of Good Friday, 1964.

The quake shook seacoast villages and towns of Peru. Some 188 were reported killed within 24 hours in the port of Callao and the capital, Lima, and between 1,500 to 3,000 persons were reported injured.

The quake began at 5:42 p.m., EDT, Oct. 17, and lasted for about 38 seconds, during which time, houses tumbled, walls were cracked and whole sections of land were moved. The earthquake's origin was calculated to be at latitude 11 degrees south and longitude 79 degrees north.

The earthquake was reported at a magnitude of 7.7 to 8 on the Richter scale—an expression of the original force or energy of the earthquake. This is considered a major quake on the Richter scale, on which the highest ever recorded was 8.9.

Only a brief day and a half later, at 4:15 a.m., EDT, on Oct. 19, another large earthquake occurred, registering 6.7 to 7 on the magnitude scale. This shook the region about 600 miles northwest of Ascension Island in the south Atlantic Ocean, about midway between Africa and South America, and nowhere near civilization.

Very minor earthquakes are of about magnitude 0; houses and buildings are damaged at magnitude 5, and major damage is produced with quakes above magnitude 6. Only two earthquakes have ever been recorded with magnitude 8.9.

The Alaskan Earthquake of March 27, 1964, had a magnitude of 8.5—one of the most severe North American earthquakes ever recorded. It took 114 lives and caused over $300 million worth of damage.

Because the Peruvian quake occurred at sea, death and damage may not be too high. An earthquake of this size can usually start a tsunami, or immense sea wave radiating outward across the ocean. Tsunami warnings were issued as soon as the earthquake was reported, but then canceled when only slight waves, five feet high, were reported at a tidal station at La Punta, Peru. Tsunami alerts were maintained, however, until all possible danger had passed.

Sometimes these tsunami, after traveling across the ocean at speeds of more than 500 miles an hour, can rise to heights of nearly 100 feet as they approach land.

Many earthquakes occur along the western coast of South America, which includes some of the most geologically active regions in the world. With the Andes Mountains still in active stages of growth, there are frequent earthquakes, outbursts of volcanoes, folding of the earth's crust, and slippage along large earth crevices.

This region is part of the great earthquake belt that encircles the Pacific Ocean. About 90% of the world's earthquakes occur along this belt. The second large earthquake zone extends westward from the Pacific Ocean through Indonesia, the Himalayas, the mountains of the Middle East and the Alps.

A devastating series of earthquakes took place on this belt last Aug. 19, in the Erzurum region of Turkey, with the main shock of the series measuring about 6.7 on the Richter scale. Although this quake was not so intense as that off Peru, it occurred in a populated area, and the damage to civilization was large. More than 3,000 people were reported killed and over 2,000 dwellings destroyed.

When an earthquake is generated, often by slippage or breakage of rocks that have been under enormous pressures beneath the earth, vibrations are sent out from the source in all directions, traveling through the earth at various speeds, some as high as six miles per second. These seismic waves are picked up by sensitive instruments at various stations around the world.

By calculations and comparisons of the speeds and types of earth waves, seismologists can determine the exact time and location of an earthquake, and also its size.

Vibrations of the Peru earthquake were received on instruments at the major U.S. seismic stations of Tucson, Ariz.; Newport, Wash.; College, Alaska; Honolulu, Hawaii, and Guam. These reports were sent to the National Earthquake Information Center, part of the Environmental Science Services Administration (ESSA). Reports also were received from seismic observatories in Africa and Chile.

GEOLOGY

Ice Cap Age Disputed

➤ THEORIES about the age of Antarctica's ice cap are being disputed by a University of Southern California geologist.

Scientists generally have held that the Antarctic has been covered by ice for about a million years. But Dr. Orville Bandy, professor of geology and micropaleontology, dates the vast ice cap at closer to 11 million years old.

New clues to glacial periods which have taken place in the geological history of the vast continent at the bottom of the earth resulted from Dr. Brandy's study of the fossils of one-celled sea animals.

The USC scientist now believes that there have been at least three major periods of glaciation in the Antarctic—one of them at least 11 million years ago (late Miocene), another perhaps four or five million years ago (Pliocene) and a third within the last two or three million years (Pleistocene).

Oddly enough, some of the fossil evidence which Dr. Bandy and his colleagues have been studying came, not from the Antarctic, but in deep-sea sampling of sediment off the coast of southern California.

These sediment cores yielded the fossil remains of one-celled animals planktonic foraminifera, known to be dwellers of extremely cold water, which had been transported into local sub-tropical waters by ocean current not only during the classic Ice Age, but millions of years earlier.

Dating the fossil specimen material with a potassium-argon radiometric process, Dr. Bandy and one of his students, James Ingle, discovered one cold water invasion of the Late Miocene geological epoch and another within the Pliocene.

The scientist said his findings are substantiated by two independent lines of evidence gathered in other studies:

1. A similar fossil study in the Southern Indian and Antarctic Oceans shows a dominant strain of radiolarians (a similar species of extreme cold water dwellers) spanning the interval from the Late Miocene age to the present.

2. Radiometrics dating of fossil deposits collected from beneath volcanic rocks in the Antarctic is reported by others, showing the presence of an ice cap possibly as old as the Miocene.

"These various lines of evidence clearly indicate that the area has been covered by an intermittent, if not a continuous polar ice cap dating back 11 million years or longer," Dr. Bandy said.

Dr. Bandy's study was conducted in cooperation with the National Science Foundation Antarctic Project.

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