SEISMOLOGY

Difficulties Encountered In Prediction of Earthquakes

By N. H. HECK, Chief, Division of Terrestrial Magnetism and Seismology, U. S. Coast and Geodetic Survey.

AFTER the earthquake of November 1, which shook most of the cities in the northern part of the United States from Maine to Wisconsin, all available seismologists were asked for opinions as to whether further shocks might be expected. While most of the statements were qualified, nearly all agreed that there would probably be further shocks, though felt over a lesser area than the main shock.

Now no reputable seismologist will venture an earthquake prediction. Why then was there willingness to express opinions in this case? It was because all great shocks are followed by aftershocks, and because of knowledge of the performance in individual earthquakes in the same region.

While we do not know the ultimate cause of earthquake, we do know something of the mechanism by which they probably occur. A slipping occurs somewhere deep in the earth and elastic waves which we recognize as earthquake waves go out. Now the slipping is for the purpose of relieving strain in the rock. If the slipping in the first shock is nearly the amount required to relieve the strain, the aftershocks will be unimportant. More usually it is too little or too much, and the adjustment is completed by further slipping, accompanied by strong aftershocks.

May Be None

So far it appears that the first shock on November 1 nearly completed the adjustment, since there have been no aftershocks felt outside of Ontario and Quebec. The last Canadian earthquake of importance in February, 1925, had no important aftershocks.

One difficulty of the seismologist in making an explanation to the public is that each person is interested primarily in one place and wants to know whether a further earthquake will be felt in that place. This is just the information that cannot be given and a simple illustration will show why.

Suppose that stones are dropped into a pond from a height of ten feet and that there is an observer at the opposite side of the pond and another in a boat at rest somewhere in the pond. The waves or ripples have to be of a certain size to be observed and their size depends on the size of the stone. At the far side of the pond only the waves from a large stone will be seen. At the boat many from smaller stones will be seen. The ripples from very small stones will be seen only if the boat comes close.

It then can be said that since the earthquake occurred east of Lake Huron in Canada, 550 miles from Washington, only a shock equal to the first would be likely to be felt in Washington, but the probability of a shock being felt in New York and Michigan cities would be much greater. The case is not so simple as for the pond but still the analogy holds fairly well. It is not possible to say how far any particular shock may reach.

Swarm Earthquakes

The case of the recent Montana earthquake is quite different. Though one of the shocks occurred just twelve hours before the Canadian shock there is no relation between them and their characteristics are totally different. This belongs to the unusual type of swarm earthquakes. There have been nearly 800 shocks, according to the local Weather Bureau station at Helena, of which three have been severe and two of them destructive. With strong shocks on October 12, 18 and 31, the proper prediction is that so long as the swarm earthquakes continue fairly strong shocks are likely to be interspersed among them.

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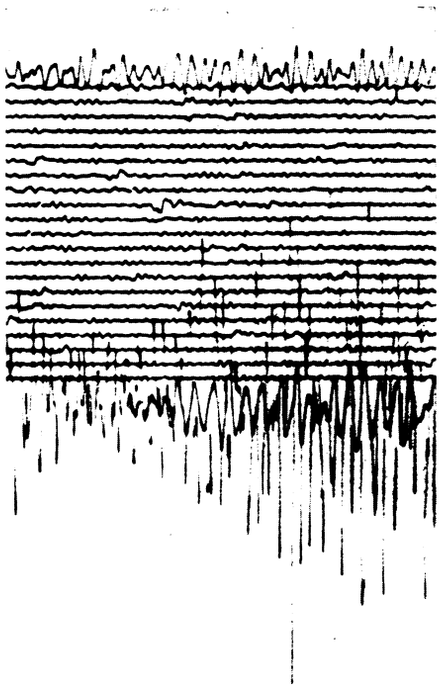

EARTHQUAKES

The seismograph at Canisius College, Buffalo, enables two earthquakes to write their own records. The top line shows the end of the Montana disturbance. The larger disturbance at the bottom of the record is the nearer Canadian quake.

PHYSIOLOGY

Body Fatigue Studied at Altitude of 20,140 Feet

ALL ALTITUDE records for scientific expeditions working on terra firma were broken last summer by scientists of the Harvard Fatigue Laboratory who worked in the Andes Mountains of northern Chile, according to a preliminary report by Dr. Ancel Keys, the expedition director.

Much of the research on the effects of altitude on heart action, vision and mental alertness was carried out at an elevation of 20,140 feet above sea level, some five thousand feet higher than the previous record, made in the Italian Alps.

Due to the rarity of the atmosphere and lack of oxygen, members of the expedition were unable to walk fast at the 20,000 foot level, but a well-adapted person could do steady physical work for hours at a stretch.

In general the men became adapted to the height easily but their capacity for intense work was noticeably decreased as the oxygen content of the air became lowered.

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