SEISMOLOGY

Quake Prediction Seen

➤ A WAY TO PREDICT earthquakes in the future by tuning in on the sounds rocks make when they are under great stress is seen as possible by a Washington scientist.

He wants to listen to the "pings, chirps and beeps" that rocks make just before they rupture. Such sounds might serve as a diagnostic tool for forecasting earthquakes, Dr. Dean S. Carder, research seismologist at the U.S. Coast and Geodetic Survey's office of research and development, believes.

A geophone, a sensitive instrument to detect vibrations would be buried one or two thousand feet deep near an earthquake fault, a crack in the earth's crust along which movement takes place, usually in a zone of weakness. It would be used to detect the sounds, and a continuous record made on a tape at the surface.

Dr. Carder's system has not been tried yet, although a proposal to conduct such an experiment is being considered by the Coast and Geodetic Survey.

The equipment and installation would cost about a third of a million dollars.

In answer to a question, Dr. Carder told SCIENCE SERVICE that the test could be started just as soon as the money was made available. A severe earthquake, such as the one that shook Morocco in 1960, can kill thousands of persons and cause damage running to many millions of dollars.

Geophones have been used with some success in deep mines to warn of rock bursts. They detect the sounds sent out by the rocks before they explode from the walls with tremendous force. However, because the warning sounds were sometimes heard and mines closed when no rock burst occurred, they were not a psychological success with the miners.

In addition to the geophones, Dr. Carder proposes using a laser, which emits a powerful beam of very intense light, or similar device to measure the distance across a fault along two diagonals at a slight angle to each other.

If this were done either continuously or very frequently, once an hour or more often, a change in the distance between the two beams and their targets might show the build-up of extreme strain just before the rupture that causes an earthquake.

An earthquake is the earth's way of relieving stresses and strains in the planet's crust and upper mantle. Where they are likely to occur is known, but not when.

Distance-measuring devices having light beams less intense than a laser's are now in use to check on slow changes along a known earthquake fault. However, these measurements are now taken at infrequent intervals, say once a year. Dr. Carder believes the changes should be checked continuously or nearly continuously.

Dr. Carder pointed out that if there were an earthquake during the time between measurements, much might have happened and there would be no record. Another proposal is to install a strain seismograph near the fault to measure the stresses of rocks, which might indicate the future occurrence of an earthquake.

If possible, Dr. Carder would also like to install with the geophone and laser distance-measuring devices a magnetometer to measure any changes in earth's magnetic field as proposed in London by Dr. F. D. Stacey of the meteorological research unit, Cambridge, England.

In the British scientific journal Nature, 200:1083, 1963, Dr. Stacey suggested that magnetic variations build up during a period of months before an earthquake and that these changes could be detected easily.

He said instruments of the required accuracy were cheap, simple and reliable. Dr. Stacey urged a weekly survey of the total magnetic field to detect the warning changes.

Dr. Carder pointed out that the magnetic changes might be recorded continuously if the equipment suggested by Dr. Stacey could be tied in with the apparatus recording information from the geophone, laser devices and other instruments at the fault site.

The number of scientists who believe something can be done about predicting earthquakes grows each year, thanks to advances in knowledge of the earth's structure.

• Science News Letter, 84:404 Dec. 28, 1963

MILITARY SCIENCE

Nuclear Blast Detectors Ring Nation's Capital

➤ IF A NUCLEAR BLAST ever destroys the Nation's capital, a computer in Pennsylvania may be the first machine to learn about it.

At least, that is the theory behind an electronic warning system now being tested for the U.S. Air Force Systems Command. Purpose of the system is to automatically and rapidly detect and report nuclear bursts to a computer many miles from explosion-sensing devices.

Four prototype sensing posts linked to the Pennsylvania computer now ring Washington. They are in West Virginia, Pennsylvania, Virginia and Maryland.

The system is designed to provide information that will help in making evaluations for fallout warning, prediction and damage assessment after a nuclear explosion. The sensor sites are unmanned and provide 24-hour surveillance.

Each sensing post reports three different observations simultaneously. Optical equipment reports the flash, seismic equipment the shock, and electromagnetic radiation detectors the energy generated by the detonation.

The system is called the Nuclear Detonation Detection and Reporting System, or NUDETS. It is said to work so quickly that almost every nuclear blast can be reported before that explosion can destroy the detecting equipment.

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Questions

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