

I. MURATA: Some aspects of earthquake prediction in Japan

Dr. Ichiro Murata of the Faculty of Surveying, University of Technology Malaysia, presented his talk entitled "Some aspects of earthquake prediction in Japan" on 1st October 1982 at the Dept. of Geology, University of Malaya to a crowd of about 35. Dr. Murata is a gravimetry specialist seconded from the Earthquake Research Institute, University of Tokyo, Japan.

Japan is an Earthquake Country as it suffers frequently from earthquakes. The need for earthquake prediction had been given top priority. In fact it is one of the country's urgent scientific research projects which is taken as a national project.

The three factors of earthquake prediction are place, time and magnitude. The current target figures are a place of 100 km distance, time of 1 month and a magnitude of ± 1 .

According to Dr. Murata, nowadays, the cause of earthquake is known to be a breaking up phenomenon of the earth's crust under accumulating stress. The mechanism of great earthquakes is especially well explained by means of the plate tectonics hypothesis.

For earthquake prediction it is necessary to identify the precursors of earthquakes. Judging from the mechanism of earthquake occurrence, the following list presents the phenomena which can be taken to assume the role of precursors:

- Seismological phenomena (like seismicity gap, foreshock, change in mechanism, change in seismic-wave velocity)
- Geophysical phenomena other than seismological ones (like geomagnetism, geoelectricity, gravity, radioactivity)
- Geodetic measurements (like triangulation, contraction, extension, trilateration, levelling, sea level change, crustal movements, strain, tilt)
- others (like underground water, animal behaviour, meteorological phenomena).

There are evidences accumulated to show the relationship between these phenomena and earthquake occurrences.

Although the characters of these phenomena as precursors are not yet fully understood, it is hoped that further studies will reveal them in the near future.

In Japan the administration for the earthquake prediction project has three centres set up to monitor and collect the data on various geophysical phenomena. They include the Crustal Activity Monitoring Centre, the Seismicity Monitoring Centre, and the Earthquake Prediction Observation Centre. Through these channels data are then presented to the Coordinating Committee for Earthquake Prediction.

This committee is responsible for the judgement of anomalous phenomena suspected to be precursors. The area where anomalous phenomena are found is designated, according to the degree of anomaly and their significance, as the Area of Special Observation, the Area of Intensified Observation, and the Area of Concentrated Observation.

These designations are based on such factors as the neighbouring region of great earthquakes, a calm region after a great earthquake of some hundreds years ago, a suspected area from the viewpoint of geo-

science although there is no historical earthquake document, stress accumulating area, and high density population area.

In Japan, the present state of observation network for earthquake prediction are now operating following forms of observation networks as well as scientific research. These include geodetic survey (with precise geodetic network consisting of 6,000 stations and a survey repetition cycle of 5 years; precise levelling network of 20,000 km in length, with a survey repetition cycle of 5 years over a suspected area for 1 - 2 years), tidal observation (100 stations at 100 km separation), crustal movement observation (about 20 observatories - some other proposed observatories), seismic observation (modernized instrumentation for existing meteorological observatory - several tens, micro earthquake observatory - 19 stations, deep bore hole station - 3 stations), seismic wave velocity (one a year), geomagnetic observation (14 stations), and data processing centres.

During the discussion that followed, Dr. Murata was able to confirm that the rate of success of prediction has been good, that the Japanese people are understanding about the vast sum of money spent on earthquake prediction and research, and assured the audience that Peninsular Malaysia is outside the sphere of earthquake activity.

G.H. Teh
