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PREDICTING EARTHQUAKES

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Earthquakes are known to occur since time immemorial. There are more than a million shocks yearly over the globe. As much as two hundred and fifty earthquakes are felt every day some where in the world though not always reported. Three shocks out of these may be expected to be big enough to cause appreciable damage in an average day. The distribution of these, over the globe is not uniform but there are regions, the so called Earthquake Belts in which, normally their epicentres fall. We have, today, hundreds of recording stations, registering several thousands of earthquakes every day and dozens of research centres carrying out extensive research with most modern techniques, on topics connected to earthquakes. An important aspect of recent earthquake studies of common interest has been how to predict future earthquakes. This note might provide a reader an idea of our present state of knowledge about earthquake forecasting.

It might be worth while to quote here opinion of Prof C. F. Richter, world renowned Seismologist about earthquake prediction—"No one can predict earthquakes in any reasonable meaning of the word prediction". One can very well understand how ambitious and fascinating is the task for seismologists to predict earthquakes. Earthquake prediction involves difficult questions like—when ? Where ? and How big ? As regards first question, though the date and time would be the complete answer but probably it would be statisfactory if we could even tell the year in which earthquakes may occur. The second question would require an answer in terms of latitude and longitude of the epicentre and also the depth of focus. The depth of focus is important, since a shallow earthquake is liable to cause greater damage though locally compared to a deep earthquake of same magnitude. However the earthquake magnitude, the answer to the third question is the most vital since it would determine whether at all the earthquake would be damaging or not. Some of the common concepts which, it is felt by us, may help in finding answers to these questions are given here :

(1) In localities where earthquakes have originated in the past are likely to be visited by earthquake in future also.

(2) Future earthquakes may be considered to be not less dangerous than those of the past, in that locality.

(3) It can be expected that earthquakes of a locality, with a certain energy (measure of size), maintain a definite statistical trend in their frequency of occurance.

(4) Probably the frequency of earthquake occurance in a locality is more for smaller earthquakes and less for bigger earthquakes. This kind of dimishing of frequency with increasing manitude may follow some definite statistical law.

(5) Pertinent geologic data and tectonic history of an area should form a sound basis for attempting earthquake forecasting.

(6) It is rare that an earthquake of any consequence occurs unaccompanied by smaller ones. After shocks are common but foreshocks from the same source might also precede a large earthquake.

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(7) It may be possible to correlate the mode of strain energy release during earthquake to isostatic anomalies, earth's magnetic field and other similar geophysical data/ parameters for the same locality.

(8) It is expected and has also been observed in some areas that the gradual elastic strain energy accumulation preceeding earthquake may be associated with crustal deformation. Observations of such crustal deformation would determine the trend of strain build up and may help in calculating the time which would lapse before the fracturing of the rocks i.e. earthquake takes place in that area.

Apart from these, for final appraisal of the intensity (violence of being felt) of an earthquake at a site, considerations have to be given to the area liable to be damaged by a single earthquake which in turn depends upon several other factors, leading to greater uncertainty to the task of earthquake forecasting. So far, hardly any thing has been possible which might be considered as an approximate earthquake pediction. Yes, one may think at this stage why at all attempt such a difficult task and how would it be useful at all if done. May be even if we had pre known a disastrous earthquake in an area it would not be possible for us to shift the property liable to be damaged from there. No, we can do a lot with this information. The damage during earthquakes is primarily due to fires, power and water supply failures which can be avoided by taking necessary precautions. Life loss can also be reduced considerably. The buildings and other engineering structures being designed and constructed there can be made strong just enough to resist likely earthquake. All the structure may have to be designed for greater strength in an seismically unstable area whereas with earthquake forecast available savings may be possible by keeping allowance on design for that earthquake only which is likely there. The great benifactors of earthquake forecast would be earthquake insurance companies who would be able to workout more profitably the insurance premiums and increase their business. At the present the earthquake forecasting only finds its expression in seismic regionalisation maps delineating areas of differing seismicity which serve useful purpose in the absence of earthquake forecasts.