Letters to the Editor

550·34 : 551·508·9

RECORD OF ALASKAN EARTHQUAKE OF 1964 ON ANNAMALAINAGAR MAGNETOGRAMS

The official time for the Alaskan earthquake at its focus was 0336·2 GMT of 28 March. The first effect of this earthquake shock was recorded by the *H* and *D* magnetic instruments at Annamalainagar at 0348 GMT, 11·8 minutes after the origin time of the earthquake as given in U.S.C.G.S. cards. Six minutes later, there was a distinct impact from another set of shock waves. There was also a third and a fourth impact caused by a different set of shock waves emanating from the source of the earthquake. The magnetograms were disturbed in this manner for 26 minutes before they regained normal trend, which lasted only for a brief period of 34 minutes. The instrument was again subjected to another series of shocks lasting for 19 minutes. The shocks had been recorded by *H* and *D* magnetometers only and not by V.F. magnetometer as had been noticed before at Annamalainagar.

The epicentral distance of this earthquake is of the order of 103° from Annamalainagar and the travel time for *P* waves for that distance is about 14 minutes. The accuracy of the time scale of the ordinary Annamalainagar magnetogram is of the order of ± 3 minutes. As such the impact at 0348 might correspond to the incidents of first *P* motion. The incidence of other impacts after 0348 are due to the impact of other elastic waves which follow in an earthquake motion.

In addition to these shock effects a distinct sudden impulse in *H* and *D*, 54 minutes earlier to the shock had also been recorded. The amplitude of the sudden impulse in *H* is 7γ in the negative direction.

In the city of Kodiak (Alaska), the magnetic instrument installed in connection with airborne magnetic survey work had recorded a sudden impulse in *F*, one hour and six minutes prior to the great earthquake. The impulse was 100γ in *F* in the positive direction. Writing about this positive impulse ahead of the earthquake at Kodiak, Moore (1964) has suggested the possibility of its resulting from piezomagnetic effects of rocks undergoing change in stress. He suggests that these magnetic disturbances ahead of the earthquake could be used to predict major earthquakes in time to save lives and property.

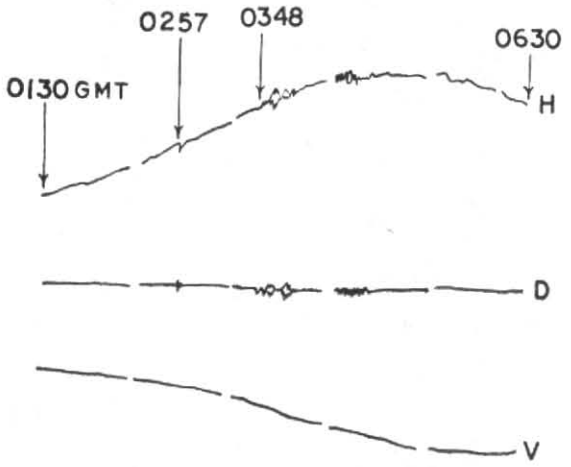

Fig. 1. Magnetogram record of Alaska earthquake and the sudden impulse preceding it

It is difficult to ascribe the preceding magnetic impulse before the earthquake recorded at Annamalainagar as the result of piezomagnetic effect as the epicentre of the shock is too far away to change the magnetism of the rocks below the Annamalainagar surface on account of the stress prior to the earthquake. The time lag in the recording of these sudden impulses at Kodiak and at Annamalainagar also do not support such an assumption, in view of the well known fact that magnetic disturbances are worldwide and simultaneous. Besides, the various earthquake records of the Annamalainagar magnetogram examined so far do not indicate similar sudden impulses prior to the earthquakes.

Yet this distinct sudden impulse before the earthquake recorded both at Kodiak as well as at Annamalainagar cannot be set aside lightly. The observed difference in time in the records of the sudden impulses at these two stations works out to be 27 minutes. The travel time for *S* – wave for $\triangle = 103°$ is about 26 minutes. This coincidence in time lag between the sudden impulses and the travel time of *S* – wave, directs one to look for some other explanation other than piezomagnetic effect.

It is a question of conjecture at this stage to ascribe the sudden impulses at Kodiak and Annamalainagar as due to some disturbance which must have travelled with the speed of transverse elastic waves. It can probably be seen non-elastic in character since it has affected only the magnetic

and not the seismological instruments. The magnetic instruments may become a helpful tool in the forecasting of earthquakes when the exact causes for these sudden impulses are understood.

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REFERENCE

Moore, G. W. 1964 *Nature*, 203, p. 509.