ΦΥΣΙΚΗ. – **On the contribution of selectivity to the prediction of earthquake epicenters,** *by P. Varotsos, K. Alexopoulos, K. Nomicos and M. Lazaridou - Varotsou*,* διὰ τοῦ 'Ακαδημαϊκοῦ κ. Καίσαρος 'Αλεξοπούλου.

Since 1981 it is known that seismic regions emit electric currents six to 115 hours before an earthquake (EQ). The study of a large number of such electric pulses resulted in the establishment of rules connecting their strength to the magnitude and the epicentral distance[1]. The pulses registered at various stations decrease with increasing epicentral distance (r) according to a 1/r law and therefore a comparison of their relative strengths leads to the prediction of the epicenter[2] with a reliability around 80%. In many cases, however, some of the measuring stations do not register any signal whatsoever although warranted from the magnitude of the impending EQ and the epicentral distance[3]. The phenomenon was (improperly) labelled as the «directivity effect», a name that implicitly produces the impression that the currents are anisotropically emitted from the seismic area. As an example of such an observation it has been found that an EQ at region A might give a signal at station B while an EQ at region B was never registered at station A. The recent study based on a much larger number of earthquake regions showed that the phenomenon cannot be exclusively due to an anisotropic emission of current. This can be proved in the following example: Let stations 1 and 2 define a straight line on which a seismic source lies. We have found cases where an impending EQ from the source was recorded at station 1 but not at station. 2. This could not be due to a lack of current emission in the direction of station 2 because no signal would have reached station 1 as well. All that can be said, to date, is that for unknown reasons each station shows a systematic *selectivity* at to seismic regions for which it is insensitive. These regions although reducing the data available for a prediction can be of value in certain cases. This happens when the data are insufficient to lead to a single solution for the epicenter; it can then happen that the selectivity might reduce the number of solutions. As an example we refer to a recent prediction

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reported by the authors to a session of the special committee on the prediction of earthquakes set up by the Ministry of Public Works and consisting of scientists of different disciplines. A signal was registered only at two stations and therefore in principle the solution is a geometrical locus in the form of a circle[3]. However, by evaluating the selectivity effect the prediction could be reduced to two possible epicenters, in this case either a EQ with M=4.8 in the sea to the south of Peloponese or a EQ with M=5.2 on the western coast of Asia Minor near the island of Samos. In effect 40 hours later at 05:46 GMT of December 18, 1985 a M=5.1 event occurred at the island of Lesvos, 150 km to the north of the predicted second epicenter at (39.1° N, 26.1° E). As no EQ larger than M=4.6 had occured within the region 25°-27° E and 36°-40° N (220 ×450 km) since 14 months the probability of the prediction being fulfilled by chance is around 10^{-3}.

The elucidation of the selectivity is one of the many empirical facts concerning the electric precursor signals that await a physical explanation. At the time a compilation of maps of the effective seismic regions of each station is in progress. It is clear that this is not possible in a short time because a large number of EQ from different seismic regions have first to be studied. Nevertheless, the present preliminary note is justified in order to bring the importance of selectivity to the attention of anyone who might be experimenting on precursor telluric currents.

ΠΕΡΙΛΗΨΙΣ

Ἡ συμβολὴ τοῦ φαινομένου τῆς δεκτικότητος εἰς τὴν πρόγνωσιν τῶν σεισμῶν

Ἀπὸ ἐτῶν ἦτο γνωστὸν ὅτι πρόδρομα ἠλεκτρικὰ σήματα δὲν ἐμφανίζονται εἰς ὡρισμένους σταθμοὺς καταμετρήσεως. Τοῦτο εἶχεν ἀποδοθῆ ἐν μέρει εἰς ἀνισότροπον ἐκπομπὴν τοῦ ἠλεκτρικοῦ ρεύματος ἀπὸ τὴν ὑποκεντρικὴν περιοχήν. Νεώτεραι παρατηρήσεις ἀποδεικνύουν ὅτι δὲν πρόκειται περὶ φαινομένου κατευθυντικότητος ἀλλὰ περὶ δεκτικότητος τῆς ὁποίας ἡ ἐξήγησις ἀκόμη δὲν εἶναι δυνατή.

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