

INVESTIGATION OF M-WAVES
AT SAINT LOUIS UNIVERSITY

by

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INTRODUCTION

In routine earthquake seismology an important consideration is the identification of as many wave phases as possible on an earthquake record. To facilitate the identification of these phases travel-time tables and graphs based on empirical studies of a single well-recorded earthquake or on statistical analyses of many earthquakes have been constructed that give the arrival times of particular phases (P,PR,S,etc.) as a function of the distance traveled. In the case of the body waves these tables and graphs have proved very useful. A similar statement, however, can not be made for the travel-time tables of the surface wave group. The wide scattering of observed points in the case of surface waves is attributable to several causes. First the variation in the structure of the earth's crust from one place to another results in a variation of wave velocity with path; second, surface waves exhibit the phenomenon of dispersion, that is the variation of the velocity with the period of the wave. In particular the author has noted a pronounced discrepancy between the actual arrival time of the M-phase at Saint Louis and the arrival times predicted for this phase by various tables. As used here the term M-phase refers to the waves of the surface wave group that contain the maximum amplitudes and that are

very regular in form. This definition for M agrees in part with those used by other authors. Macelwane (59 page 260)* says that M represents the shorter and more regular waves of large amplitude that follow the L waves. Byerly (12, page 181), says that M denotes the group of waves having the maximum amplitude. Finally, the International Seismological Summary for 1936, page 3, defines M as the time when the maximum amplitude is recorded.

It was this wide disagreement between the actual arrival time of M and its predicted arrival time that first led the author to consider an analysis of the M phase recorded at Saint Louis as the object of his doctoral research. After consulting J. B. Macelwane, S. J., Director of the Department of Geophysics, Saint Louis University, it was decided that the analysis would include not only the construction of the necessary time tables for M, but also a determination of the characteristics of this phase on the Saint Louis seismographic records.

* Numbers in parentheses refer to bibliographic entries.