THE DETERMINATION OF CRUSTAL THICKNESS IN CENTRAL AMERICA FROM THE SPECTRUM OF DILATATIONAL BODY WAVES

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Haskell (1962) established a relation between a given component of motion of an incident P wave at the bottom of a system of n parallel layers and the same component of motion at the surface. This relation is a complex function of frequency and was called by Haskell the Transfer Function of the system.

Hannon (1964) suggested the possibility of studying the crustal structure under a station from the crustal Transfer Functions obtained using Haskell matrix method. Working with the ratio of the vertical and horizontal Transfer Functions he obtained a result independent of the frequency content of the source.

Phinney (1964) used the method to investigate the crust in Albuquerque and Bermuda. He obtained good results.

Fernandez (1965) computed a set of master curves for the determination of the crustal thickness and the average crustal P wave velocity. He tested these curves in determining the crustal structure of Central United States and obtained also good results.

In the present study this set of master curves was used to find the crustal parameters in Central America and in the northern portion of South America. The ratio of the vertical and horizontal Transfer Functions was obtained from the spectrum of the long period P waves. This ratio was plotted versus frequency and the final curve was matched with the master curves for the particular angle of incidence corresponding to the event being considered.

Quito (QUI), Bogota (BOG), Caracas (CAR), Trinidad (TRN), Panama (BHP), Las Palmas (LPS), and Puerto Rico (SJG) were the stations studied. An average of three events for station was considered and a total of 22 Transfer Function curves was obtained.

In matching the curves it was found that in most cases the fit was poor or that there was no fit at all. When the fit was good the crustal solutions were different from those one might expect from other knowledge of the region.

An examination of some of the possible sources of errors was made. It was found that, in particular, the presence of a Mohorovicic discon-

tinuity dipping with respect to the horizontal might introduce considerable error in comparison to the assumed case of parallel layers. It was finally proposed that this effect itself may offer a possible way of investigating the dip of the crust-mantle boundary under a station using only P wave spectral information from that station.