CRUST AND UPPER MANTLE STRUCTURE OF

TURKEY AND THE INDIAN SUB-CONTINENT

FROM SURFACE WAVE STUDIES

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DIGEST

Regional variations of the velocity structure of Turkey are determined using single-station measurements of Rayleigh and Love wave group velocities in the period range 8 to 50 sec. A differential inversion scheme yields a model for Turkey in which upper mantle shear wave velocities are slower than those of most of Europe. Comparisons of upper derived mantle shear wave velocities with reported P_n velocities leads to a Poisson's ratio value between 0.29 and 0.30 for eastern Turkey and between 0.25 and 0.28 for western Turkey. The crust-mantle boundary obtained in this study is gradational, but if a shear velocity of 4.2 km/sec is taken to define the upper mantle then the crust appears to be about 40 km thick throughout all of Turkey.

Azimuthal variations of Rayleigh and Love wave group velocities in western Turkey are consistent with velocities predicted by an anisotropic upper crust in which vertical cracks are oriented in an approximate E-W direction. This interpretation is consistent with geological information, fault-plane solutions, and lineations mapped from satellite observations, but the possibility that these variations are caused by lateral changes of velocity in the crust of western Turkey cannot be ruled out.

A single-station method is applied to Love waves generated by Indian earthquakes in the period range 4 to 60 sec and the model resulting from an inversion of those data is compared to that previously obtained from Rayleigh data by Hwang (1985). Like Turkey, the crust-mantle boundary obtained in this study is also gradational, but if a shear velocity of 4.4 km/sec is taken to define the upper mantle then the crust

appears to be about 40 km thick in Indian shield and about 55 km thick in the Himalaya.

The data in this study do not require a low-velocity zone in the upper mantle for any of the regions.

Rayleigh wave attenuation data for Turkey were inverted to obtain an average Q_β model. Q_β is about 150 in the crust and about 70 in the upper mantle at a depth of about 110 km.