SURFACE-WAVE ATTENUATION AND ITS LATERAL VARIATION IN THE CRUST OF THE SOUTHWESTERN UNITED STATES

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A Digest Submitted to the Faculty of the Graduate School
of Saint Louis University in Partial Fulfillment of
the Requirements for the Degree of
Doctor of Philosophy

2002

Digest

Shear wave Q (Q_μ) models are obtained for a broad region of the southwestern United States. A single station method that compares observed amplitude spectra of fundamental and higher-mode Rayleigh waves to theoretically predicted spectra for assumed Q_μ models is used to determine Q_μ as a function of depth. Velocity structure and initial Q_μ models are assumed for event-station pairs in which the events have known source depths and focal mechanisms. 164 event-station paths obtained from 33 earthquakes and 32 stations provide good path coverage for the region. The coverage is adequate to map lateral variations of Q_μ at various depths in the continental crust of the southwestern United States. Two Q_μ earth models of the crust are presented. Both models have three horizontal crustal layers of varying thickness overlying a uniform half-space. The analyses reveal that the Q_μ variations correlate with changes in surface tectonics of the region. Average Q_μ values for the upper crust for the whole region are found to vary between 55 and 75. These low values are expected for the seismically active and highly fractured crust of California and for the rifted Basin and Range province. Higher average Q_μ values (103-116) are found at mid-crustal and lower-crustal depths. Q_μ variations patterns are compared to geological and geophysical parameters of the southwestern United States, and found to partially correlate with heat flow patterns of the region.