SURFACE WAVE ATTENUATION AND ITS LATERAL VARIATION IN THE CRUST AND UPPER MANTLE OF THE SOUTH AMERICAN CONTINENT

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

1993

DIGEST

This study uses fundamental-mode Rayleigh and Love waves to study crustal and upper-mantle velocity structure beneath South America, and uses the attenuation of those waves to study Q structure. In addition, Q data for the Lg phase will place constraints on the frequency dependence of Q_β in that region.

The data indicate that the phase and group velocities of fundamental mode Love and Rayleigh waves in eastern South America are higher than those in western South America. Inversion of regionalized surface wave velocities leads to distinctly different models for the stable eastern region and tectonically active Andes, which have crustal thicknesses of about 40 and 55-60 km, respectively. Crustal models for north-central and eastern South America are similar and there is no significant low-velocity zone required by the data in either eastern or western South America.

The comparison of the surface wave attenuation coefficients obtained for east, north-central and western South America indicates that: 1) attenuation values are higher for the younger active tectonic regions of western South America than for the older stable region in the eastern part of the continent; 2) a low-Q zone exists in the upper mantle of both eastern and western South America; 3) a comparison of the theoretically predicted attenuation of 1-Hz Lg

waves with observed values suggests that the frequency dependence of the crustal Q_β for the tectonically active region of western South America is much lower than in the stable region of east, and can be considered to be independent of, or weakly dependent on, frequency.