ATTENTUATION OF HIGH FREQUENCY

EARTHQUAKE SURFACE WAVES IN SOUTH AMERICA

Mehdi Raoof Malayeri, B.S.

A Digest Presented to the Faculty of the Graduate School
Of Saint Louis University in Partial Fulfillment of
the Requirements for the Degree of
Master of Science (Research)

1984

DIGEST

Earlier attenuation studies for the South American
continent indicated that there is low attenuation for Sn and
Lg waves in the shield region east of the Andes, whereas in
the west of South America, with some exceptions, there is
high attenuation for Sn and Lg waves.

However, these studies were non-quantitative. In this
thesis Q_* values for high frequency Lg waves for South America
are presented, based on a scattering model of Aki as extended
by Herrmann for the coda waves of shallow local and near
regional earthquakes. The results of the coda Q method are
compared with those obtained using Nuttli's method. These
coda Q_o-values are in good agreement with the apparent Q_*
of Lg waves obtained by the latter method. The data were
obtained from over 100 local and regional earthquakes
recorded by 12 WWSSN stations throughout continental South
America. These data provided a range of frequencies from
0.4 to 1.4 Hz. Frequency dependence of Q was investigated
for the range of frequencies observed by assuming
$Q = Q_o(f/f)^l$. The observed data indicate that the tectonic
region of western South America is characterized by low
Q_o and a large value of the frequency dependent factor,
l, with values ranging from 150 to 350 and 0.4 to 0.7, respec-

tively. Q_0-values increase in the shield region east of the Andes but frequency dependence decreases. Average crustal Q_0-values obtained for north and central Argentina range from 420 to 580 and ζ ranges between 0.2 and 0.3. The Q_0 values are larger in the Brazil region, ranging from 580 to 980, with ζ varying from 0.0 to 0.2.

In the lower attenuation region of eastern South America higher values of attenuation correlate with greater thickness of the sedimentary layers.