RAYLEIGH WAVE PROPAGATION AND ATTENUATION ACROSS THE ATLANTIC OCEAN

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Fundamental-mode Rayleigh waves generated by several earthquakes situated along great-circle paths between pairs of seismograph stations on the American and European coastal regions and on Atlantic islands have been analyzed to obtain anelastic attenuation coefficients, group and phase velocities, azimuthal anisotropy coefficients, and specific quality factors of Rayleigh waves. Inversion of the dispersion and attenuation data yield shear velocity models and shear wave internal friction models for several regions of different age in the Atlantic Ocean. Synthetic seismograms are used to further investigate the nature of anelastic attenuation in the northern part of the Atlantic Ocean.

The results obtained in this study are as follows:

(1) The anelastic attenuation coefficients and internal friction are related to the age of the Atlantic Ocean floor, older regions being characterized by higher Q values.

(2) A low-Q zone is well developed in the upper mantle of all regions less than 65 m. y. in age, but is poorly developed in older regions.

(3) There is no clear systematic variation of Rayleigh

or shear velocities with the age of the Atlantic Ocean floor.

(4) Rayleigh wave dispersion and attenuation in the northern portion of the Atlantic Ocean between Spitsbergen and Greenland is not characteristic of a young oceanic region.

(5) Comparison of the results of this study with earlier results for the Pacific Ocean indicate that the anelastic attenuation coefficients and the Q_{β}^{-1} values for the ridge region of the Atlantic Ocean (0-11 m. y. or 0-23 m. y.) are much smaller than for the East Pacific Rise (~10 m. y.). In general, for regions of similar age in both oceans, the attenuation coefficients and Q_{β}^{-1} values are smaller for the Atlantic than for the Pacific. The above results suggest that the low-velocity, low-Q zone under the Atlantic Ocean floor is more poorly developed there than in the Pacific. Since plates separate more slowly in the Atlantic than in the Pacific this comparison suggests that attenuation coefficients and internal friction values are smaller when the velocity of plate motion is slower.

(6) The Rayleigh wave velocities and shear wave models support the earlier work of Ossing (1964) and Bravo and Udias (1974) which found little influence of the Mid-Atlantic Ridge on the Rayleigh velocities.