# ANALYSIS AND INVERSION OF THE DISPERSION AND WAVEFORMS OF SHORT PERIOD RAYLEIGH WAVES (Rg) IN MAINE

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## DIGEST

Detailed information about the shallow crustal structure of Maine is very limited. Geophysical techniques to characterize lateral variations in the structure would be useful to improve knowledge of the structure. This study focuses on United States Geological Survey data sets from refraction surveys within the State of Maine. These data contain excellent recordings of short period Rayleigh waves (Rg) generated by explosions. The data set also exhibits interesting wave propagation characteristics, such as lateral changes in the moveout of the Rg, S and P waves.

Analysis techniques were developed to successfully invert for laterally varying earth structure and to model the Rg waveforms, in terms of both absolute amplitude and phase. Both the velocity and attenuation structures in the upper 1-2 km of the crust in Maine were evaluated. The derived laterally varying models for the various regions, not only yield synthetic seismograms that match the observed Rg-wave, but the inferred lateral shear-wave velocity changes strongly correlate with published geologic data, such as the bedrock geologic map of Maine.

Velocity models derived from surface waves were used to predict the observed S-wave arrival times. An excellent fit between the observed S-wave arrival times and the arrival times predicted by ray tracing was obtained without having used the S-wave data in the inversion for the earth models.

The derived shear-wave velocity models indicate that faster velocities are confined to paths parallel to the structural trend of the region while the slower velocities are seen for paths perpendicular to the structural trend.

Since absolute recording instrument gains are known, forward modeling was used to test the laterally varying velocity and Q model by comparing the observed and estimated amplitude decay in different frequency bands. This permitted an estimate of the isotropic moment for one ton explosions.