Seismic velocities of crustal samples from the Torngat Peninsula and Nain: ECSOOT'96

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The subsurface geology of central and northern Labrador, as well as the Labrador Shelf, is presently being interpreted through the use of various seismic techniques. In the fall of 1996, LITHOPROBE funded a wide-angle seismic refraction experiment (ECSOOT'96) off the coast of Labrador to determine the subsurface geology of *in situ* mid-lower crust to Moho depth. Forty representative samples were taken from two areas of Labrador, namely the Torngat Peninsula and southern Nain Province. Laboratory measurements of compressional and shear wave velocities to confining pressures of 600 Mpa were performed on the sample set, the results of which will be used for comparison with offshore seismic data to determine the lithologic nature of the mid-lower crust.

Seismic velocities from both sample sets fall within two lithological fields, felsic and mafic. Felsic samples from the Torngat Peninsula have compressional wave velocities (Vp) ranging from 6.2 to 6.6 km/s and shear wave velocities (Vs) from 3.6 to 4.0 km/s, while mafic samples have Vp between 6.5 and 7.2 km/s, and Vs between 3.8 and 4.2 km/s. Felsic samples from the southern Nain Province have Vp between 6.2 and 6.7 km/s, and Vs between 3.5 and 3.7 km/s, while mafic samples have Vp between 6.7 and 7.0 km/s and Vs between 3.7 and 4.0 km/s.

Anisotropic samples were found in both regions of Labrador, as determined by both compressional and shear wave velocity data. Anisotropic samples were typically mafic and/or displayed a definite foliation and/or lineation defined by the orientation of anisotropic minerals.

Based on this data it can be concluded that strong reflections would most likely be produced by contrasts between mafic and felsic rocks. Based on seismic refraction data from the Torngat Peninsula, the predominantly felsic rocks that occur onshore in outcrop continue at depth and become increasingly majfic within the lower crust.