

Lithoprobe East: Marine Deep Seismic Reflection Results
Across the Appalachians North of Newfoundland

*G. Quinlan, Department of Earth Sciences
Memorial University of Newfoundland, St. John's, Newfoundland
A1B 3X5, and The Lithoprobe East Group*

Approximately 2600 km of 30-fold marine deep seismic reflection data, recorded to 15-20 seconds two-way travel time (approximately 50-60 km depth), have been gathered north of Newfoundland and across the adjacent continental shelves and basins since the fall of 1984. These data, which provide the critical third dimension needed for interpreting deep crustal tectonics, have profoundly influenced our interpretations of surface and near-surface geology. In particular, lines 84-1 and 84-2, which cross all of the major geological zones defined in Newfoundland, were positioned with the aim of relating deep crustal structure to surface geology. A preliminary geological interpretation of the seismic results is currently in press.

Our preliminary interpretation tentatively established: the under-thrust eastern limit of the stretched Grenville continental craton, which underlies the Humber and western Dunnage zones; the allochthonous nature of at least the western portion of the Dunnage zone; a tectonically disrupted Moho beneath the Humber zone; and the vertical nature of the Dover Fault,

which separates the Gander and Avalon zones. The Bale Verte Lineament (boundary between the Humber and Dunnage zones) and the Gander River Ultramafic Belt (boundary between the Dunnage and Gander zones) have no deep crustal expression, suggesting that they are allochthonous features.

We have identified three seismically continuous lower crustal blocks beneath the Newfoundland Appalachians. (1) The Grenville craton, traced from surface exposures in Labrador, continues beneath the foreland basin and the Humber zone, and in fact extends 70 km eastward beneath the Dunnage zone. Beneath the Humber and Dunnage zones, the Grenville craton thins eastward, reflecting late Precambrian stretching and rifting. (2) A lower crustal block of uncertain affinity (continental?) underlies the eastern Dunnage and Gander zones. This "Gander" block appears to have a "collisional" relationship with the Grenville craton to the west. (3) Avalon lower crust exhibits a markedly different seismic character from the "Gander" block to the west, from which it is abruptly separated by the Dover Fault.