

Reprocessed Vintage Seismic Reflection Data for an Improved Subsurface Imagery of the Laurentian Margin Architecture: Southern Quebec Appalachians

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Reprocessed and reinterpreted vintage seismic reflection data provide cost-effective results and a better image of the subsurface structural architecture of the St. Lawrence platform and Appalachians of southern Quebec. A key data-set currently being evaluated is a trio of seismic reflection profiles recorded in 1978 for the Government of Quebec. The seismic lines (2001, 2002, and 2003) represent a total of 270 line-km of data, all of which cross the Appalachian structural front (Logan's Line) and foreland fold and thrust belt. The seismic data were recorded using a Vibroseis source, 58-12 Hz sweep, 48 channels, and 12 fold coverage. The input digital files were original, unfiltered stack data. Processing steps applied were bandpass filter, F-X deconvolution, dip scan (slant) stack, Kirchoff time migration, and trace amplitude equalization.

New observations include: 1) thrust and fold structures northwest of the mapped structural front, within the St. Lawrence platform. For example; a possible incipient triangle zone structure above a footwall ramp of the principal Appalachian décollement; 2) ramp-associated folds and detached thrust sheets, and tectonic wedges; 3) presence southeast- and northwest-dipping rift faults, forming half-grabens; 4) shallow sub-horizontal décollement beneath thrust nappes; 5) steep dipping margins delineating the anticlinorium of the hinterland, including NW-dipping back thrusts on the NW limb, and SE-dipping normal faults on the SE limb. The seismic reprocessing and ensuing interpretation and integration with other geoscience data may provide a new impetus for oil and gas exploration along the St Lawrence Lowlands and Appalachians of southern Quebec.