

Deep Seismic Imaging of Continental Margins: Examples from the 9-km Long Offset, 18 Second NovaSPANTM and Beaufort-MackenzieSPANTM Data Sets

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In 2002 GX Technology Corporation (GXT) initiated a worldwide 2-D seismic continental-margin reconnaissance program using a 9-km long cable and recording to 18 seconds. These SPAN™ programs have been designed to provide regional basin-wide PSDM (Prestack Depth Migrated) data sets to image down to the base of the crust. Since then, GXT has acquired several tens of thousands kilometers of such data across continental margins worldwide.

The NovaSPAN data was acquired in 2003 and consists of 3,400 km of seismic lines shot across the Nova Scotia Margin. This data provides a comprehensive regional geological framework which when integrated with well data allows visualizing, in depth domain, how key elements of the basin architecture evolved through time. We have observed rotated crustal blocks in the deep water beyond the slope and allochthonous salt basins. These might have been caused by transtension along a transform fault zone which in turn might be suggestive of shifts and changes in the basement hinge zone. The SPAN survey concept thus provides the coverage length and depth of imaging to reveal how complex basin tectonics are controlled by structural deformation and sediment loading through time.

As another example of basin scale analysis, in 2006, GXT acquired Beaufort-MackenzieSPAN, which is yielding new insights into the nature of the offshore Beaufort Foldbelt, suggesting that the belt consists of detachment folds with a 10km average wavelength and very little faulting, as opposed to the reigning interpretation of a series of north-verging imbricated fault-bend and/or fault-propagation folds.

It is our contention that SPAN data sets, in conjunction with other detailed “prospect and/or exploration level” surveys, will aid the industry in the definition of petroleum systems and new plays, especially at great depth and in a range of water depths along continental margins.