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NEBC Liard Basin Structures

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Summary

The Liard Basin is an important sub-basin of the Western Canada Sedimentary Basin, located in Northeast British Columbia, Yukon and Northwest Territories, at a prominent structural re-entrant in the eastern margin of the Canadian foreland belt (Figure 1). Bounded on the east by the Bovie structure (Wright et al. 1994; MacLean and Morrow, 2004), the Liard Fold and Thrust Belt (Mackenzie Mountains) to the northwest and the Rocky Mountain Foothills to the southwest, the basin comprises a region with a few gentle folds, high angle faults and nearly undeformed strata. The basin has a rhomboidal shape (Figure 1). Significant unconventional gas resources occur within Upper Devonian – Lower Mississippian (Tournasian) shales of the Liard Basin (Ferri et al., 2015; NEB, 2016). The Liard Basin contains up to 5 km of Phanerozoic strata overlying Proterozoic strata and the Laurentian craton, and is characterized by thick upper Paleozoic and mid-Cretaceous strata (Leckie et al., 1991; Wright et al., 1994).

The primary focus of this study was to use available-for-purchase 2D seismic data to regionally map the structures of the Liard Basin in Northeast British Columbia, south of the Yukon / Northwest Territories border (60^{o} N latitude), in the area indicated by the red polygon in Figure 1. The shape of the Liard Basin largely reflects the orientation of older Paleozoic and Proterozoic structures that helped localize Cretaceous deformation. Proterozoic structures appear to define its eastern and western margins, and helped to locate all the prominent folds in the Liard Fold and Thrust Belt. Proterozoic strata are involved in all the major structures of the adjacent Liard Fold and Thrust Belt and the Rocky Mountain Foothills as well as the Bovie Structure (Figure 1). The southern edge of the basin demonstrates no major structural features.

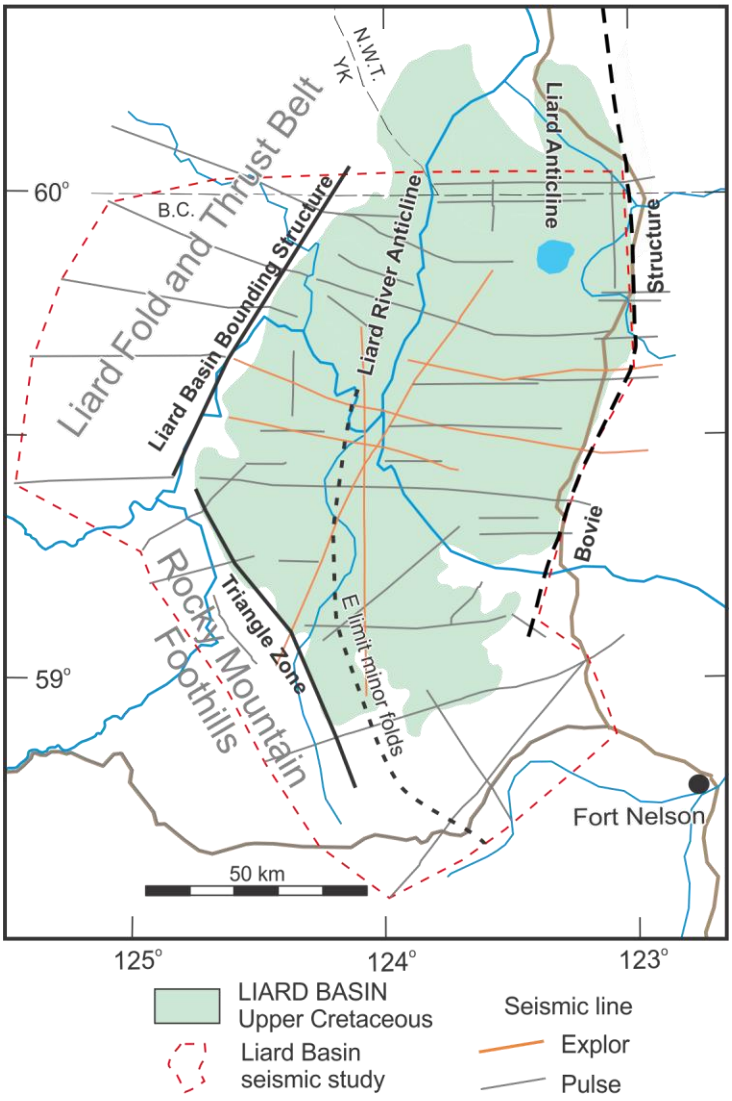

Figure 1. Location map for the Liard Basin seismic study (red outline) located in Northeast British Columbia Canada, at the northwestern end of the Western Canada Sedimentary Basin (WCSB). The green colour indicates the Upper Cretaceous sediments and the general extent of the Liard Basin. The red outline indicates the seismic constraints of the study and the seismic lines are coloured by owner; orange for Explor and black for Pulse Seismic. Key structural features are identified.

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