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Evolution of Sediment Transport Pathways in the Western Canada Sedimentary Basin during the Triassic

Martyn L. Golding
Department of Earth and Ocean Science, University of British Columbia, Vancouver, BC
mgolding@eos.ubc.ca

J.-P. Zonneveld
Department of Earth and Atmospheric Science, University of Alberta, Edmonton, AB

Jim K. Mortensen
University of British Columbia, Vancouver, BC

Mike J. Orchard
GSC Pacific, Natural Resources Canada, Vancouver, BC

Fil Ferri
Resource Development and Geoscience Branch, Oil and Gas Division, BC Ministry of Energy, Mines and Petroleum Resources, Victoria, BC

It has previously been thought that the western margin of the Laurentian continent was passive during the Triassic, with sediment being shed from the craton and into the Western Canada Sedimentary Basin (WCSB) until the Jurassic. Earlier studies of sediment thickness and paleocurrent directions in northeastern BC have supported this view. According to this model, convergence between Laurentia and the pericontinental terranes such as the Yukon-Tanana terrane occurred during the Jurassic, with sediment being sourced from both the west and the east. However, more recent work in the Yukon based on structural measurements and the dating of detrital zircon samples, has suggested that convergence occurred much earlier in the Permian. In order to test this model, further samples have been collected from northeastern BC for detrital zircon analysis. Sixteen samples were taken from eight sections on Williston Lake, along with five samples from a section to the south of the Halfway River. The ages of these samples were determined using biostratigraphy. This was based in part on existing collections of conodonts and ammonoids at the Geological Survey of Canada, and in part on new collections of conodonts, ichthyoliths, ammonoids and bivalves made at the same time as the detrital zircon samples. The well defined biostratigraphy of the Triassic means that it is possible to date the detrital zircon samples with a high precision, and the samples vary in age from Smithian to Rhaetian. Radiometric dating using the U-Pb method provided the age of the detrital zircons themselves. Although the majority of grains analysed yield ages consistent with derivation from the Proterozoic rocks that make up northwestern Laurentia, a subset of the detrital zircons yield anomalous ages that suggest either derivation from other sources, or from re-working of more local sedimentary rocks. This data requires a more complex sedimentary system for the WCSB during the Triassic than has previously been assumed. Future work will involve examining a wider geographic area in an attempt to map out the sedimentary transport pathways and to understand how they change throughout the Triassic. Changes in sedimentary transport pathways has consequences for the distribution and composition of the clastic sediments of the WCSB, including the Toad and Liard Formations, equivalents of the subsurface natural gas-bearing Montney and Doig Formations.