

Provenance Studies on the Bowser and Sustut Basins, and their Implications for the Depositional History of the Bowser Basin and Regional Tectonic Models

Carol Evenchick*

Geological Survey of Canada, Vancouver, British Columbia, Canada
cevenchi@nrcan.gc.ca

Vicki McNicoll

Geological Survey of Canada, Ottawa, Ontario, Canada

Terry Poulton

Geological Survey of Canada, Calgary, Alberta, Canada

and

Peter Mustard

Simon Fraser University, Burnaby, British Columbia, Canada

Abstract

Provenance studies of the frontier Bowser and Sustut Mesozoic clastic basins elucidate their depositional histories. A suite of sandstone to siltstone samples from nonmarine to distal marine lithofacies assemblages in the northern 2/3 of the Bowser Basin was collected for U-Pb detrital zircon geochronology. The samples, ranging from Bathonian to early Cretaceous in age, are from localities where depositional age is narrowly and confidently constrained paleontologically. In each sample the youngest population of grains dominates the detrital zircon dataset, and is within error of the depositional age determined from ammonites. This dataset suggests that detritus from late Middle Jurassic to earliest Cretaceous volcanism was deposited coeval with deposition from other sources. The absence of volcanic flows or proximal volcanic facies in the study area, with the exception of a temporally and geographically restricted case, suggests that this volcanic contribution was likely of airfall origin. The older detritus in all samples is Triassic through Middle Jurassic, and likely derived from Stikinia and/or Quesnellia, in addition to the Cache Creek source of radiolarian chert clasts.

The consistent results from Bowser samples provide a measure of cautious confidence in using detrital zircons to constrain the ages of successions lacking fossils. The boundaries of lithofacies assemblages are the target of this aspect of the study.

Detrital zircon analyses from the Cretaceous Sustut Basin range in age from Archean to Cretaceous, suggesting derivation from sources including the Omineca Belt, in contrast to the Bowser Basin rocks that show no evidence of a North American source.