

Mesoproterozoic basins in Yukon: Their connection to the Belt-Purcell Supergroup and the break-up of supercontinent Cumbia

Medig, K.P.R.¹, Thorkelson, D.J.¹, Rainbird, R.H.², Davis, W.J.², Turner, E.C.³, Gibson, H.D.¹, and Marshall, D.D.¹

¹ *Department of Earth Sciences, Simon Fraser University, 8888 University Drive, Burnaby, BC, V5A 1S6, Canada*

² *Geological Survey of Canada, Natural Resources Canada, 601 Booth St., Ottawa, ON, K1A 0E8, Canada*

³ *Department of Earth Sciences, Laurentian University, 935 Ramsey Lake Road, Sudbury, ON, P3E 2C6, Canada*

The breakup of supercontinent Columbia is recorded by Mesoproterozoic extensional basins along the western margin of Laurentia. The early Mesoproterozoic Belt-Purcell basin, in west-central Laurentia, and the broadly correlative Trampas and Yankee Joe/Defiance basins, in southwestern Laurentia, developed during rifting of Columbia and the onset of separation of Laurentia from Australia. Provenance studies on these basins have demonstrated an influx of sediment from both Australia and Laurentia. The Australian sediment is characterized by detrital zircon ages within North American magmatic gap (NAMG; 1610-1490 Ma). Younger Mesoproterozoic basins in western Laurentia, such as the Marqueñas, Lemhi, and Missoula basins, do not show an Australian source. This change to a Laurentian-only source has been interpreted as separation of the two continents and the disassembly of supercontinent Columbia.

New data from two basins in Yukon, Canada, demonstrate a similar evolution for the northwest margin of Laurentia between ~1.5 and ~1.3 Ga. Detrital zircon ages from the PR1 basin display a near-unimodal population of 1499±3 Ma. The mineralogical character of the sediment is consistent with a metaplutonic source region. Provenance of PR1 sediment has been interpreted as the Williams and Narku batholiths of the Mt. Isa Inlier in northeastern Australia and sediment was deposited after 1.46 Ga. Accordingly, the PR1 basin has been interpreted as an extensional basin within Columbia during the onset of rifting between Laurentia and Australia. In contrast, the younger Pinguicula basin provides evidence that Laurentia and Australia had separated by the latter part of the Mesoproterozoic. The Pinguicula detritus has very few grains from the NAMG and the youngest zircon population indicates deposition sometime after ~1322 Ma. Pinguicula Group provenance studies indicate that sediment in the Pinguicula basin was derived exclusively from Laurentia, with a sparse NAMG population reflecting recycling from earlier Mesoproterozoic basins. Taken together, stratigraphic and provenance data from throughout western Laurentia point to rifting from Australia from ~1.5-1.45 Ga, followed by the development of an intervening seaway later in the Mesoproterozoic.