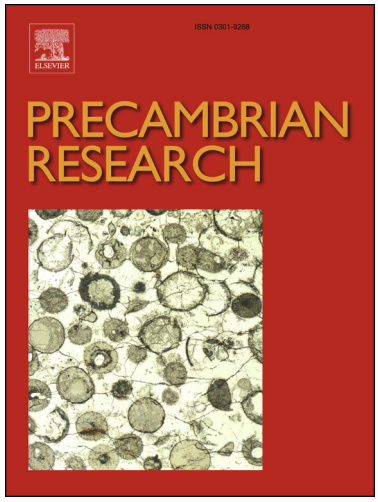

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PII: S0301-9268(16)30356-4
DOI: http://dx.doi.org/10.1016/j.precamres.2017.01.027
Reference: PRECAM 4660

To appear in: *Precambrian Research*

Received Date: 11 September 2016
Revised Date: 23 January 2017
Accepted Date: 25 January 2017

Please cite this article as: B.M. Frieman, Y.D. Kuiper, N.M. Kelly, T. Monecke, A. Kylander-Clark, Constraints on the geodynamic evolution of the southern Superior Province: U-Pb LA-ICP-MS analysis of detrital zircon in successor basins of the Archean Abitibi and Pontiac subprovinces of Ontario and Quebec, Canada, *Precambrian Research* (2017), doi: http://dx.doi.org/10.1016/j.precamres.2017.01.027

Constraints on the geodynamic evolution of the southern Superior Province: U-Pb LA-ICP-MS analysis of detrital zircon in successor basins of the Archean Abitibi and Pontiac subprovinces of Ontario and Quebec, Canada

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Abstract

To investigate the tectonic development of the southern Superior Province, new U-Pb laser ablation inductively-coupled mass-spectrometry analysis of detrital zircon was conducted on graywacke samples from successor basins of the Abitibi and Pontiac subprovinces. The three successor basin successions investigated are the 2690-2685 Ma Porcupine assemblage and the 2679-2669 Timiskaming assemblage of the Abitibi subprovince, and the ~2682 Ma sedimentary rocks of the Pontiac subprovince. Predominately Neoarchean zircon grains (80-95% of the total zircon population) reflect local sources in the Abitibi and Pontiac subprovinces. The successor basins were deposited within 100 Ma of the majority of the detrital zircon grains primary crystallization ages, which is consistent with patterns observed at modern convergent margin settings. Porcupine assemblage samples contain ~5% Mesoarchean zircon, while Pontiac subprovince and Timiskaming assemblage samples contain ~18% and ~13%, respectively. No local Mesoarchean sources exist in the Abitibi or Pontiac subprovinces, suggesting input from an adjacent hinterland. The higher proportion of Mesoarchean zircon in the Timiskaming assemblage relative to the Porcupine assemblage suggests that detritus from the hinterland was more prevalent during the later stages of collision, probably as a result of progressive uplift and denudation of the hinterland. The high proportion of Mesoarchean zircon in the Pontiac subprovince sedimentary rocks may reflect an additional Mesoarchean source. Comparison to previously published geochronology data for the Superior Province indicates that the hinterland was to the northwest and is, in part, composed of the Winnipeg River, Marmion, and Opatica subprovinces. Patterns of contractional deformation, successor basin formation, and felsic plutonism progressively young to the south in the southern Superior Province and are interpreted in terms of accretionary processes. Detrital transport across subprovince or terrane boundaries, progressive hinterland emergence, and foreland-directed propagation of the