

Paleoproterozoic Earth: Setting a Template for Modern Tectonics and Related Geological Processes

By: Dr. David Corrigan (Geological Survey of Canada)

Abstract:

The Canadian Shield provides an unparalleled field laboratory for the study of secular changes in tectonic processes. Breaking up of continental crust that previously amalgamated during the Neoproterozoic produced new oceanic lithosphere, as well as thinned continental crust on which intracontinental and marginal basin formed, sequestering CO₂, Ca, Mg, P, and other elements from the oceans in the process. Along the continental edges, tholeiitic magma provinces, including flood basalt, formed where mantle plumes impinged prior to breakup. After opening for about 155 Ma, which is similar in duration to the time span of the modern Atlantic, the main (Manikewan) ocean closed producing arcs and back-arc basins that were later accreted to continental margins. In the Labrador Trough, Fe released in ca. 1.88 Ga transtensional marginal basins precipitated in shallow, well-oxygenated near-shore waters, forming world-class iron-ore deposits of the Schefferville/ Labrador City areas. Fragments of the Manikewan paleo-ocean are now only preserved in the Watts Group of Cape Smith belt, where they are preserved in a klippe. Continental arc magmatism resulting from ocean lithosphere subducting beneath continental margins produced elongate batholiths and plutonic suites semi-continuous over distances of 2000 km or more, on scales comparable with Phanerozoic arcs. Accretion and collision following ocean closure resulted in the development of foreland and molasse basins, fed by modern-like fluvio-deltaic systems. In terms of collisional processes, many hallmarks observed in the Alpine-Himalayan orogenic system occurred, perhaps for the first time in Earth's history, in the Superior-Churchill collision system (Trans-Hudson orogen). These processes include indenter tectonics, lower crustal flow, radial flow, formation of oroclines, and lateral extrusion. These observations suggest that thermal, petrological and mechanical parameters of the crust and mantle had attained states similar to those observed today by the Paleoproterozoic, roughly midway through Earth's evolution.

This talk is available at the [OFFICIAL CTG YOUTUBE CHANNEL](#); Click [Here](#) for the full presentation.

CTG Online Seminar Series

www.canadiantectonicsgroup.ca



CTG
Canadian Tectonic Group

CTG Online Seminar Series
www.canadiantectonicsgroup.ca

Paleoproterozoic Earth: Setting a Template for Modern Tectonics and Related Geological Processes

Dr. David Corrigan
Geological Survey of Canada

Tuesday, 20th October 2020 @ 1:00 PM EST

GEOLOGICAL ASSOCIATION OF CANADA
ASSOCIATION GEOLOGIQUE DU CANADA