Chemical composition of detrital apatite as an indicator of sedimentary provenance and as a modifier of fission track age: Sverdrup Basin, Canadian Arctic archipelago

M. Collins[1] and D. Arne[2]
[1]*Department of Earth Sciences, Dalhousie University, Halifax, Nova Scotia B3J 3J5, Canada*
[2]*Department of Geology, University of Ballarat, Ballarat, Victoria, 3352, Australia*

The Sverdrup Basin is the largest sedimentary basin in the Canadian Arctic. Its sediments were deposited in two sequences: Proterozoic to mid-Paleozoic and late Paleozoic to early Cenozoic, and deformed and uplifted by the Ellesmerian and Eurekan orogenies. Detrital apatite samples have been obtained from nine wells and eight field locations representing both of the above sequences. The analysis of fission tracks in apatite grains can yield information on burial, cooling and exhumation events

in sedimentary rocks. Fission track data from the southern Sverdrup Basin constrain the cooling history and exhumation events in the Triassic in the southern Sverdrup Basin and in the Tertiary in the northern Sverdrup Basin.

The chemical composition of detrital apatite determined in the electron microprobe is studied in terms of two major applications: (1) The concentration of F, Cl, OH, CO_2 affects both the thermal annealing of fission tracks, and their etching behavior, therefore affecting the fission track models for cooling and exhumation that can be computed from them; and (2) The composition of detrital apatite, including the contents of halogens and REE, may characterize certain suites of igneous and metamorphic rocks, thus providing provenance data for the sediments in the basin.