

Lithological and structural mapping, microfabric analysis, and kinematic study of basement-cover thrust imbricates, Hall Peninsula, Baffin Island, Nunavut

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The rocks exposed at Ptarmigan Fiord, Hall Peninsula, Baffin Island underwent mid-crustal deformation during the middle Paleoproterozoic Trans-Hudson Orogeny and assembly of the Nuna supercontinent. The structural style in the region is characterised by imbricate panels of Archean basement orthogneiss and middle Paleoproterozoic supracrustal metasedimentary rocks, interpreted to have formed by thick-skinned ductile thrusting. Basement rocks are comprised of amphibolite-facies metatonalite, metagranodiorite, metaquartz-diorite and metamonzogranite. Cover units include amphibolite-facies migmatitic, pelitic and semipelitic schist, psammitic schist, amphibolite, calcsilicate and quartzite. Preliminary observations from bedrock mapping and sampling at a 1:50,000 scale identified three deformation events in the study area: 1) east-west crustal shortening (D_1 , pre-syn-thermal peak) in the supracrustal rocks defined by a well-developed foliation (S_{1a}) in the alignment of amphibolite-facies minerals; 2) southeast-northwest crustal shortening (D_2 , post-thermal peak) recorded by T_2 thick-skinned thrust imbricates of basement and supracrustal units; and 3) north-south crustal shortening (D_3 , post-thermal peak) documented by open upright folding (F_3) of the D_2 thrust panels. The S_{1a} penetrative foliation, variably developed in basement rocks and consistently present in cover units, is defined by the alignment of biotite, sillimanite and leucogranite veins that formed prior to and during the thermal metamorphic peak. The S_{1a} foliation was deformed by 100m scale F_{1b} isoclinal folding. The T_2 ductile thrust faults at the base of seven basement-cover imbricates are identified by the repetition of tectonostratigraphic units and strain localization, and are interpreted to be predominantly south-to-southeast verging based on shear-sense indicators. Two structural domains of D_2 thrust imbricates are recognized. Map-scale crosscutting relationships indicate that the northwestern domain overthrust the eastern domain on a southeasterly T_{2c} -directed thrust fault, following F_{2b} folding of T_{2a} basement-cover thrust imbricates in the eastern domain. The Ptarmigan Fiord area contains a world-class exposure of thick-skinned thrust structures that are delineated by belts of distinctive grey-weathering Archean basement rocks and brown- to black-weathering Paleoproterozoic supracrustal rocks.