



Tectonic map of the central and southwestern Pearya Terrane, Ellesmere Island, Canada

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The Pearya Terrane is an approximately 350 km long and 100 km wide geotectonic unit at the north coast of Ellesmere Island. It consists of Mesoproterozoic to Paleozoic structural units with a different geological history than the Neoproterozoic and Paleozoic Franklinian Basin further south, that represents the northern margin of Laurentia. The Pearya Terrane collided with Laurentia during the Ellesmerian Orogeny, prior to the Early Carboniferous. However, the timing of the approach and docking is still not sufficiently determined. The Pearya Terrane is penetrated by a large number of ductile and brittle fault zones resulting in a complex mosaic of different tectonic blocks, indicating that Pearya was already a composite terrane before collision with Laurentia. Most of the pre-Ellesmerian fault zones were re-activated during the Ellesmerian Orogeny as SE- and SW-directed steep, often ductile, reverse faults. Present day, the Pearya Terrane is dominated by a complex system of up to 500 m wide, brittle strike-slip faults zones predominantly parallel to the continental margin. Those faults have affected Carboniferous through Triassic cover rocks of the post-Ellesmerian Sverdrup Basin, Cretaceous dikes, plutons and volcanic rocks and Paleocene sediments on Wootton Peninsula, indicating that the Paleogene Eurekan deformation controlled the present day structure of the Pearya Terrane. It should be noted that the Eurekan tectonic episodes were characterized by opposing sinistral and dextral motions parallel to the continental margin before the final break-up of Laurasia and the separation of Greenland and Svalbard after the Eocene/Oligocene. Still, the correlation of a number of crustal blocks or slices remains difficult: i) the area of NW Kleybolte Peninsula and the area between NE Kleybolte Peninsula and west of the mouth of Philipps Inlet that exhibit rock units which are different to the sedimentary rocks of the Franklinian Basin and possibly represent faulted blocks of the Pearya Terrane. ii) the “Kulutingwak Fiord Formation” which represents elongated, fault-bounded zones within the Franklinian Basin south and SE of Wootton Peninsula and along the boundary between Succession 1 and the Franklinian Basin SW and south of Wootton Peninsula and south of Yelverton Inlet. It is still unclear until now, if the narrow blocks within the fault zones represent extremely deformed parts or slices of the Pearya Terrane or if they are part of the stratigraphy of the Franklinian Basin.

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