
**Fission track thermogeochronology
in the lands surrounding the Nares Strait,
Canadian Arctic Archipelago and Greenland:
a field report**

M. ZENTILLI¹, A.M. GRIST¹, AND J.C. HARRISON²

¹. Department of Earth Sciences, Dalhousie University, Halifax, NS B3H 3J5,

Canada ¶ ². Geological Survey of Canada, 3303-33rd St. NW,

Calgary AB T2E 0Z5, Canada

The timing of uplift and exhumation of the lands bordering the Nares Strait are being studied using the apatite fission track (AFT) dating technique. Under certain conditions AFT allows one to date the last time rocks cooled through a temperature of ca. 100°C, equivalent to exhumation from a depth of ca. 3–4 km in the crust. The analysis of confined fission track lengths in the dated apatite crystals allows modelling of time-temperature histories between temperatures of 125 and 70°C (overlapping with the *oil window*) for rocks now at the surface. The sampling strategy, in suitable rocks on both sides of Baffin Bay, Kane Basin, and Nares Strait, was intended to allow us to address specific questions concerning the uplift/exhumation related to extension and rifting in Baffin Bay-Labrador Sea, compressional tectonics of the Eureka Orogeny, and to better understand the tectonic and thermal history of Tertiary clastic sediments in the region, with implications for petroleum exploration. During August and September 2001, ca. 80 samples were collected with the help of helicopters based on the Coast Guard icebreaker Louis S. St. Laurent, funded mainly by the Geological Surveys of Germany (BGR) and Canada (GSC) as a component of the project entitled Nares Strait Geo-Cruise 2001.

On the basis of the appearance of carbonaceous matter in many of the Tertiary clastic units in Ellesmere Island, and reports of the presence of sub-bituminous and high-volatile bituminous coal in the Judge Daly and Bache Peninsula, we expect to find that fission track data will indicate that some clastic units have been heated to temperatures within the oil window. The permeable Tertiary clastic units would make excellent reservoirs. Coaly and organic rich strata are potentially good source rocks for hydrocarbons. It is possible that significant hydrocarbons (mainly gas) may have accumulated within these Cenozoic units if they have been buried by thrust stacking, in particular because many of the thrust faults are rooted in impervious evaporites. Depending on our expected results, and based on our previous AFT work in Ellesmere Island, we may recommend that future hydrocarbon exploration in northeastern Ellesmere Island should focus on sub-thrust plays to test potential structural traps at depth.