Cooling history of a failed rift margin – new insights from (U–Th)/He thermochonology along the Labrador passive margin, Canada

SARIMA VAHRENKAMP, ISABELLE COUTAND, AND DEANNE VAN ROOYEN

Department of Earth Sciences, Dalhousie University, Halifax, Nova Scotia B3H 4R2

The Labrador Sea is the result of a failed rift system between Labrador and Greenland. The initiation of rifting has been attributed to the Late Triassic to Jurassic (223–150 Ma) based on Rb–Sr and U–Pb dating of dike emplacements in southwest Greenland. Less magmatic activity from rifting has been found on the Labrador side with the oldest ages determined through fossil evidence of a diatreme yielding Early Jurassic–Early Cretaceous ages (197–145 Ma). There is still ongoing debate on the age of initiation of spreading, which represents the end of rifting. The oldest undisputed evidence of oceanic crust formation has been dated to 63.0 ± 0.7 Ma correlating to magnetic anomaly polarity Chron C27. Older ages have been attributed to 72.1 Ma (Chron C32) for southern Labrador and 66.0 Ma (Chron C28) for northern Labrador. Cessation of spreading has been determined stratigraphically to the late Eocene to early Oligocene. The asymmetry of magmatism, bathymetric/topography, sediment distribution, and crustal structure along both margins suggests a lithosphere-scale simple shear model of rifting. Low temperature thermochronometry includes a range of methods used to retrieve the thermal history of the uppermost crust, allowing dating and identification of tectonic, magmatic, and/or surface processes that have contributed to this thermal history. For this study, five bedrock samples were collected along a 200 km transect along the Labrador passive margin between Nain (56.5417°N, 61.6969°W) and Hopedale (55.4580°N, 60.2115°W). Samples will be dated using apatite and zircon (U–Th)/He thermochronometry, with closure temperatures of 70°C and 170°C, respectively. We expect to quantify the crustal cooling of the margin and identify the processes driving it. If rifting ages (Jurassic – Early Cretaceous) are obtained from our samples, we expect those to be consistent with diachronous rifting from south to north yielding progressively younger ages northwards. Alternatively, if much younger ages (Quaternary) are obtained, we expect a more uniform distribution along the Labrador margin, which could be attributed to glacial erosion generated by the Laurentide Ice Sheet which covered most of Canada including Labrador. [Poster]

Atlantic Geology, 2018, Volume 54
Atlantic Universities Geoscience Conference 2018 – 68th Annual Conference, November 1-3, 2018
doi:10.4138/atlgeol.2018.015