DISTURBING THE TIME CAPSULE: HYDROTHERMAL EFFECTS ON ZIRCON U-PB AGES

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The North Caribou Terrane forms the core of the Superior Province and is composed of Meso- to Neoarchean granitoids with volumetrically minor greenstone belts. We sampled several granitoids from the centre of the terrane (around the North Caribou greenstone belt) and seperated zircons for geochronology and trace element analyses. U-Pb isotopes and trace element concentrations were collected via LA-ICP-MS at the University of New Brunswick, and three populations were identified. The oldest population, identified in a few rocks and in xenocrystic cores of zircons, preserves ages between 3100 and 2900 Ma. The main population, 2880-2830 Ma, records a period of voluminous magmatism, and we interpret most of these ages as igneous. Notably, many of the zircons that contain 2880-2830 Ma cores possess 2760-2680 Ma rims up to 30 µm thick. Based on structures, REE patterns and Th/U ratios, these rims form two distinct groups that were derived from different processes. In the first group, the REE patterns in rims and cores have similar slopes, but different absolute concentrations. These zircons are hosted in rocks that are compositionally complex, with well-defined gneissic banding and coarse-grained felsic layers. Most of these zircons rims show REE patterns and Th/U ratios (1.7-0.3) that are similar to those of typical igneous zircon, suggesting that these zircon rims are igneous overgrowths. The second group of zircons has rims that are enriched in LREEs, but have concentrations of HREEs that are identical to their cores. These rims also exhibit low Th/U values (0.20-0.05). Zircons with these rims are generally hosted in compositionally homogeneous rocks that lack evidence for mulitple intrusions. We interpret the second type of zircon rims as a product of hydrothermal alteration of the originally magmatic phase, without significant neoblastic growth, as they do not exhibit the 'spongy' structure associated with zircons percipitated from hydrous fluids. An alteration origin for these rims requires a substantial influx of aqueous fluids, which is consistent with the regional geology, including whole-rock geochemistry and other mineral overgrowths that record potassic alteration associated with this younger event.

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