

Detrital zircon geochronology of Paleoproterozoic sedimentary rocks from the upper Huronian Supergroup, Canada

The Huronian Supergroup is a well-known succession of primarily sedimentary rocks exposed north of Lake Huron. Deposition of the succession is constrained between 2450 and 2220 Ma (million years), which corresponds with Earth's rise of atmospheric oxygen, however the depositional timing of the uppermost formations cannot be refined further due to a lack of interbedded volcanic rocks. A geochronological study of detrital zircon grains from sandstone and claystone beds from the two youngest Huronian formations, the Gordon Lake and Bar River formations, was completed in order to confine the maximum age of deposition.

Zircon is a mineral that commonly forms in trace amounts in felsic igneous rocks and records the age of lava or magma crystallization. Over time, weathering of the parent rock leads to erosion of zircon grains, which frequently become incorporated into sedimentary deposits. Detrital zircons can therefore provide a maximum depositional age for sedimentary rocks.

Uranium-lead age data was collected using laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS). Data from the youngest zircon grains indicate that deposition occurred sometime after 2315 ± 5 Ma, but prior to emplacement of igneous intrusions approximately 95 million years later. These results are consistent with reported U-Pb zircon ages from purported tuff beds in the Gordon Lake Formation, however our results support a detrital origin of the zircon grains, as opposed to a period of volcanic activity. Determining the depositional age of sedimentary successions is critical for reconstructing ancient environments and provides important information on the tectonic processes operating at the time of deposition.