Earth Sciences

Colloquium Series

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Where have all the kimberlites gone? Apatite (U-Th)/He evidence for denudation and detrital diamond potential across the Northern Canadian Shield

Abstract

Kimberlites have erupted episodically across the Northern Canadian Shield (NCS) and its margins between ~620–50 Ma. Sedimentary xenoliths and thermochronologic data indicate that at least part of the NCS was buried by Late Paleozoic sediments shed from the Ellesmerian orogen, but the spatial extent of burial and denudation is less clear. This period of burial and subsequent denudation (~380–180 Ma) coincides with a gap in kimberlite emplacement across the cratonic interior, which today preserves no sedimentary cover. In contrast, the margins retain both Permian kimberlites and Paleozoic sedimentary cover. To investigate this spatial-temporal pattern, we acquired apatite (U-Th)/He (AHe) data for 14 kimberlites across the NCS, including the first AHe data from the northern Rae Craton, Victoria Island, and Somerset Island. Our results indicate that Late Paleozoic burial extended across the entire NCS, >1500km from the Ellesmerian orogenic front. Along the margins, kimberlites are preserved as root-zone dykes and blows, suggesting that the upper portions of these pipes were denuded along with much of the cover into which they were emplaced. These results suggest that Permian kimberlites may also have been emplaced into sedimentary strata on the cratonic interior, with subsequent denudation of both kimberlites and sedimentary cover. If so, the resulting kimberlite detritus, including any diamonds, was likely transported to and deposited in Arctic sedimentary basins.



Date: Friday December 4, 2026

Time: 1:30 pm

Location: BGS 0153

Coffee and Timbits will be served.