

near the top of the sequence, suggest that the entire sequence has reversed polarity. This, along with XRD analysis of clays that show no evidence of an early marine incursion into the crater (which was initially at or below sea level) supports the interpretation that the fossil-bearing lake sediments were formed soon after impact and refutes the hypothesis that there was a long delay between impact and fossil record. We conclude that the impact age of the crater is 21.3 ± 0.6 Ma (1SE, $n = 16$), there was no long hiatus between impact and lake, and this is the maximum-limiting age on the rich fossil record, including the recently discovered land-sea missing-link mammal *Puijulla darwinii*.

Reversing the impact of the Houghton Crater, Devon Island, Canada

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The Miocene cooling age of the Houghton Crater, Devon Island, based on $^{40}\text{Ar}/^{39}\text{Ar}$ dating of a single impact-ejected gneiss clast with multiple K-bearing phases (23.4 ± 1.0 Ma) and apatite fission track thermochronology (22.4 ± 1.4 Ma) in similarly impact-melted gneiss clasts among the impact breccia was recently revised to 39 ± 2 Ma using a spot-dating $^{40}\text{Ar}/^{39}\text{Ar}$ approach on glass within the gneiss. The former age is consistent with Miocene faunal and floral fossil evidence in lake sediments within the crater. The latter more popularly cited age supports an Eocene multiple impact cluster including the Canadian Wanapitei and Mistastin craters. The possibility that the crater was much older than the fossil-bearing sediments previously could not be precluded, although no earlier fossil assemblages have been found. Using thermochronometers with a lower closure temperature (apatite-He 75°C, and zircon-He 150°C), here we report new ages for the timing of the Houghton Crater impact. (U-Th-Sm)/He ages on apatite and zircon from different partially melted granitic gneiss clasts found on the surface of the impact breccia yield mean ages of 21.4 ± 0.9 Ma and 21.2 ± 0.8 Ma. New paleomagnetic stratigraphy of the lake sediments above the breccia-sediment contact to