

Paper No. 145-2

Presentation Time: 8:15 AM-8:30 AM

HUGE >54,000 YR OLD GLACIOMARINE DELTA ON NORTHERN BAFFIN ISLAND OVERLAIN BY BOULDERS WITH <20,000 YR OLD COSMOGENIC EXPOSURE AGES: IMPLICATIONS FOR NON-EROSIVE COLD-BASED ICE ON BAFFIN ISLAND DURING THE LGM

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Cape Aston delta (~69°54'N, 67°34'W, >25 sq km), a raised glaciomarine feature ~80 m asl, lies on the extensive forelands between Clyde Inlet and McBeth Fiord on the NE coast of Baffin Island. In situ mollusks that are radiocarbon dead (>54,000 yr BP, Loken, 1966) led to the interpretation of the delta as an early Wisconsinan or pre-Wisconsinan ice-marginal feature. Hence, the delta became the cornerstone of the minimal model for Laurentide ice extent in the eastern Canadian Arctic during the Last Glacial Maximum (LGM). Large boulders resting on delta surfaces have been explained previously by 1) iceberg rafting, 2) surface reworking by sea-ice, or 3) mass wasting from glacier margins.

We used cosmogenic nuclides to date four boulders lying on the surface of Cape Aston delta and one frost-riven block from a nearby bedrock knoll (125 m asl). Three of the four boulders exhibit LGM ¹⁰Be exposure ages (12.0±0.5 ka, 17.6±0.5 ka, 13.6±0.4 ka; using 5.17 ¹⁰Be PR), whereas the fourth boulder and the bedrock sample from the knoll have pre-LGM ages (96.2±2.4 ka and 140.6±3.5 ka, respectively). Because the highest dated LGM shoreline in the area lies at ~30 m asl, deposition of the boulders cannot be explained by 1) or 2) above. Mass wasting, 3) above, such as debris flows or slush avalanches, could explain deposition of some boulders, if the LGM ice margin were near the delta apex, but probably not the largest boulders, which are up to 10 m in diameter. Moreover, boulders are not found within sediments exposed by numerous deep meltwater channels that dissect the delta surface. We propose an alternative explanation, deposition of boulders by cold-based LGM ice. Thus, this foreland, and perhaps others along the NE Baffin Island coast, was glaciated by non-erosive cold-based ice during the LGM, leaving the underlying in situ shells and pre-LGM delta undisturbed.

This scenario is compatible with recent exposure dating evidence for vigorous warm-based ice streams that occupied Baffin fiords during the LGM.

Ongoing work involves analysis of dozens of additional samples collected from boulders on Cape Aston delta and from boulders and bedrock on the highest ground (up to 550 m) across the surrounding forelands to determine both lateral and vertical extent of LGM ice.

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