

Tracking the history of the North American Ice Sheet during the Last Glacial Cycle

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Continental ice-sheets play a major role in regional and global climate change. Knowledge of ice-sheet extent is also important for glacial isostatic adjustment modelling of interglacial sea-level¹. However, relatively little is known in detail about the history of continental ice sheets prior to the Last Glacial Maximum (LGM). Of key interest is the North American Ice Sheet complex, the volumetrically most important ice sheet in the high northern latitudes. The Pb isotope composition of the authigenic FeMn oxyhydroxide fraction in marine sediments deposited proximal to North America is a promising tool to track regional chemical weathering intensity and solute flux associated with glacial extent on North America beyond the LGM^{2,3,4}. Yet existing records are currently temporally limited to the LGM-Holocene.

We present the first authigenic Fe-Mn oxyhydroxide derived Pb isotope and Rare Earth Elements reconstructions from Orphan Knoll (IODP Site U1302/03) in the NW North Atlantic spanning the Last Glacial Cycle (LGC) and both the last (TI) and penultimate deglaciation (TII). We examine the history of change in this Pb isotope record during TI and TII and discuss the significance of its variability and orbital pacing during the LGC in terms of Northern Hemisphere ice-sheet (NAIS) evolution. The Pb isotope record shows a dramatic change across MIS 5/4 towards unradiogenic values, highlighting the likely expansion of NAIS to coastal margins at this time.

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