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Leveraging non-traditional evidence for glacial isostatic adjustment to constrain past ice sheets

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Although understanding the response of ice sheets to a changing climate is a pressing issue of this century, our current knowledge of past ice-sheet changes remains limited by data sparsity. I explore approaches that leverage non-traditional datasets to constrain past ice sheet and sea-level change over the last glacial cycle. For example, I consider the potential to use past landscapes to infer crustal deformation induced by ice sheet loading. Over the ice-age, glacial isostatic adjustment produces rates of uplift comparable to some of the fastest tectonic uplift rates (~10 mm/yr) in regions hundreds of kilometers away from the maximum ice sheet extent. Additionally, I show it is possible to gain insight into longer-term continental scale ice sheet deglacial histories using small-scale ice stream dynamics. Using records for a rapid retreat of the Amundsen Gulf Ice Stream, located on the northwest Laurentide Ice Sheet, along with observations of the Bering Strait flooding as sea-level indicators, I fingerprint the timing and location of North American saddle deglaciation.