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Glacial isostatic adjustment near the center of the former Patagonian Ice Sheet (48°S) during the last 16.5 kyr

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Our understanding of glacial isostatic rebound across Patagonia is highly limited, despite its importance to constrain past ice volume estimates and better comprehend relative sea-level variations. With this in mind, our research objective is to reconstruct the magnitude and rate of Late Glacial to Holocene glacial isostatic adjustment near the center of the former Patagonian Ice Sheet. We focus on Larenas Bay (48°S; 1.26 km²), which is connected to Baker Channel through a shallow (*ca.* 7.4 m) and narrow (*ca.* 150 m across) inlet, and hence has the potential to record periods of basin isolation and marine ingression. The paleoenvironmental evolution of the bay was investigated through a sedimentological analysis of a 9.2 m long, radiocarbon-dated, sediment core covering the last 16.8 cal. kyr BP. Salinity indicators, including diatom paleoecology, alkenone concentrations and CaCO₃ content, were used to reconstruct the bay's connectivity to the fjord. Results indicate that Larenas Bay was a marine environment before 16.5 cal. kyr BP and after 9.1 cal. kyr BP, but that it was disconnected from Baker Channel in-between. We infer that glacial isostatic adjustment outpaced global sea-level rise between 16.5 – 9.1 cal. kyr BP. During the Late Glacial - Holocene transition, the center of the former Patagonian Ice Sheet rose *ca.* 96 m, at an average rate of 1.30 cm/year. During the remainder of the Holocene, glacial isostatic adjustment continued (*ca.* 19.5 m), but at a slower average pace of 0.21 cm/year. Comparisons between multi-centennial variations in the salinity indicators and existing records of global sea-level rise suggest that the glacial isostatic adjustment rate fluctuated during these time intervals, in agreement with local glacier dynamics. More specifically, most of the glacial isostatic adjustment registered between 16.5 – 9.1 cal. kyr BP seems to have occurred before meltwater pulse 1A (14.5 – 14.0 kyr BP). Likewise, it appears that the highest Holocene glacial isostatic rebound rates occurred during the last 1.4 kyr, most likely in response to glacier recession from Neoglacial maxima. This implies a

relatively rapid response of the local solid earth to ice unloading, which agrees with independent modelling studies investigating contemporary uplift. We conclude that the center of the former Patagonian Ice Sheet experienced a glacial isostatic adjustment of *ca.* 115 m over the last 16.5 kyr, and that >80% occurred during the Late Glacial and early Holocene.