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Cosmogenic nuclide constraints on the Patagonian Ice Sheet demise during the last deglaciation

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During the Last Glacial Maximum, the Patagonian Ice Sheet (PIS) formed a contiguous cap over the southern Andes from 38° to 55° S, with a sea level equivalent to approximately 1.5 m. While glaciological observations and remotely sensed data contributed to a comprehensive understanding of glacier mass changes during the last century, detailed past reconstructions of the PIS are needed for contextualizing such changes. Despite recent progress in reconstructing ice sheet geometry and configuration during the last 35000 years, constraints on the timing of ice sheet retreat and thinning during the last glacial to interglacial transition remain limited, hindering efforts to understand ice sheet volume changes and sea level budget.

We employed cosmogenic nuclide surface exposure dating on exposed bedrock surfaces at elevations ranging from 900 to 2000 meters across the Southern Volcanic Zone, providing new ^{10}Be ages (n=47), ranging from 19000 to 5000 years ago. Using these results as constraints, we then perform transient simulations of the PIS during the last deglaciation with the Ice Sheet and Sea-level System Model to test ice sheet sensitivity of the northern PIS to changing climatological inputs driven by the Community Climate System Model Trace-21ka experiment. Our new data and model simulations provide a comprehensive data-model comparison to investigate both the timing and drivers of ice sheet change following the last glacial period in the southern mid-latitudes.