



GMPE-1: Paleoclima y reconstrucciones paleoambientales

Glacial expansion during the Antarctic Cold Reversal in northern Patagonia

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For more than two decades, it has been recognized that the warming process observed in Antarctica during the deglaciation was interrupted by a slight drop in temperature between 14.5 and 12.9 ka (ka: thousands of years BP), during the so-called Antarctic Cold Reversal (ACR). Despite all scientific efforts, the spatial extent of the ACR signal across the mid-latitudes of the Southern Hemisphere remains elusive, precluding the identification of the causes and mechanisms underlying this millennial-scale climate event. In South America, recent transient paleoclimate simulation and pollen analysis suggest that the ACR cooling reached areas as far north as $\sim 41^\circ\text{S}$, however, no evidence of glacial expansion during this period has been found north of $\sim 47.5^\circ\text{S}$. Here, we present new geomorphic and chronological data from a tributary glacier of the Palena/Vintter glacial lobe ($\sim 43.5^\circ\text{S}$), in Northern Patagonia. Twenty-five new cosmogenic ^{10}Be exposure ages from the Nikkita valley provide a comprehensive glacial record of the mid-latitudes of South America, which constrain the timing and spatial extent of glacial fluctuations during the last deglaciation. Our record from Nikkita valley indicates that the ice underwent expansion/stabilization, depositing two small ridges by 16.1 ± 0.8 ka at the mouth of the valley. Then, Nikkita glacier readvanced to a similar position at 13.6 ± 0.6 ka; the moraine associated with this advance represents the maximum extent reached by the ice during the ACR in the valley. Two additional inboard moraine complexes exhibit statistically undistinguishable ages, indicating repeated glacier expansions over the ACR. Our findings extend the known footprint of the ACR glacial signal to $\sim 43.5^\circ\text{S}$ and suggest that the ACR cooling expanded throughout the entire Patagonian region. Our chronology from Nikkita glacier matches glacier records from Central and Southern Patagonia ($\sim 47^\circ\text{S} - 55^\circ\text{S}$) and New Zealand (43°S), and palynological evidence from Chilean Lake District ($\sim 42^\circ\text{S}$), suggesting a uniform glacier-climate response to the ACR trigger across the southern mid-latitudes.