

¹⁰Be and ³⁶Cl Surface Exposure age of the Puerto Banderas Moraine, Lago Argentino, Argentina, 50°S

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The Antarctic Cold Reversal (ACR) and Younger Dryas (YD) are prominent late deglacial cool periods expressed in polar ice and high latitude marine sediments between 14.8-12.7 and 12.7-11.5 ka, respectively. Debate centers on the extent to which YD cooling affected the earth's surface, particularly in the mid- to high latitudes of the Southern Hemisphere. Resolving the timing of late glacial cooling is critical to determining the degree of inter-hemispheric synchronicity as the climate system evolved after the global Last Glaciation Maximum (LGM) 16 ka. The Puerto Banderas moraine was deposited at 50°S in the rain shadow east of the Andes and between LGM moraines 60 km to the east and the present south Patagonian Ice Cap 40 km to the west. It is a sharp-crested ridge 30 km long and 10-15 m high, topped by numerous erratic boulders >1 m high ideally suited for surface exposure dating. Radiocarbon dating provides only broad age limits. A weighted mean of three ¹⁴C ages on peat younger than the moraine of 11.7±0.3 cal. ka (2 σ), along with glacier behavior elsewhere in the Andes, led John Mercer to propose that the Puerto Banderas moraine is late glacial, *ca.* 15 ka. Recent mapping and two additional ¹⁴C ages suggest that the moraine may have been deposited in stages between 15.4 and 11.9 ka. New cosmogenic surface exposure ages from the most prominent part of this moraine, however, indicate a considerably younger age. The weighted mean of ¹⁰Be ages from quartz in 8 boulders is 11.3±0.7 ka. Moreover, the weighted mean of ³⁶Cl ages from 8 other boulders is 10.9±0.9 ka. The weighted mean age of all 16 boulders is 11.1±0.5 ka. Uncertainties include analytical and production rate contributions. Our previous work in the region suggests that production rates may be 10% higher than expected owing to reduced air pressure during the late glacial and the early Holocene. Thus, the age of 11.1±0.5 ka is a maximum for the Puerto Banderas moraine and although it is possible that it formed after the YD, it is highly unlikely that it was deposited during the ACR. Lago Cardiel, a closed lake basin 175 km to the NE, was highest at 11.7 ka. Marine sediments cored west of the Andes at 41°S show warm sea surface temperatures and low salinity at 11.0 ka, consistent with increased precipitation and glacial erosion. These paleoclimate proxies imply that the Puerto Banderas records southern Patagonian Ice Cap expansion due to increased precipitation, likely tied to focusing of the moisture-laden southern Westerly storm track at 50°S between 12 and 11 ka.