



Cosmogenic nuclide exposure age and optically stimulated luminescence dating of glacier extent around the North Patagonian Icefield during the Late Pleistocene-Holocene transition

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Elucidating the timing and extent of former glacier fluctuations is important because of the palaeoclimatic inferences that can be drawn from such studies. Here we present new geomorphological evidence of the patterns of glacier behaviour around the North Patagonian Icefield during the Pleistocene and Holocene. We have obtained dates for glacier recession around the North Patagonian Icefield using both cosmogenic nuclide exposure age dating and optically stimulated luminescence (OSL) dating. We used a combination of fieldwork and ASTER imagery to map features including the contemporary glaciers, areas of ice-scoured bedrock, trimlines, glacial lineations, terminal moraines, sandur and fluvial sediments, deltas and ice-contact deposits, and alluvial fans. Recession of the icefield is marked by distinct moraine sets.

We focus on one of the valleys, the Rio Exploradores-Rio Bayo valley, where detailed fieldwork provides evidence for the existence of two types of former ice masses; (i) a large outlet glacier of the North Patagonian Icefield, which occupied the main Rio Bayo valley, and (ii) a number of small glaciers that developed in cirques on the slopes of the mountains surrounding the valley. Cosmogenic nuclide exposure age dating of two erratic boulders on the floor of the Rio Bayo valley indicate that the outlet

glacier of the icefield withdrew from the Rio Bayo valley after 10.9 ± 1.0 ka (mean of two boulders dated to 11.4 ± 0.9 ka and 10.5 ± 0.8 ka). Single-grain optically stimulated luminescence (OSL) dating of an ice-contact landform constructed against this glacier indicates that this ice mass remained in the valley until at least 9.7 ± 0.7 ka. A date obtained from a boulder on a cirque moraine above the main valley indicates that glaciers advanced in cirques surrounding the icefield some time around 12.5 ± 0.9 ka. This evidence for an expanded North Patagonian Icefield between 10.9 ± 1.0 ka and 9.7 ± 0.7 ka implies cold climatic conditions dominated at this time. The agreement between the two independent dating techniques (OSL and cosmogenic nuclide exposure age dating) increases our confidence in these age estimates.