



The North Patagonian Icefield: large-scale geomorphology and dating of glacier advances 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 Holocene and Pleistocene and the first cosmogenic isotope and optically stimulated luminescence dates from the vicinity of the North Patagonian Icefield during the Late Pleistocene-Holocene transition. 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.

In the Rio Exploradores-Rio Bayo valley detailed fieldwork provides evidence for the existence of two types of former ice masses in this area; (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 isotope dating of two erratic boulders on the floor of the Rio Bayo valley indicate that the outlet glacier of the icefield occupied the Rio Bayo valley between 11.4 ± 0.9 ka BP and 10.5 ± 0.8 ka BP. 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 9.6 ± 0.8 ka BP. The agreement between the two independent dating techniques (OSL and cosmogenic dating) increases our confidence in these age estimates. 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 BP. This evidence for an expanded North Patagonian Icefield between 11.4 ± 0.9 ka BP and 9.6 ± 0.8 ka BP implies cold climatic conditions dominated at this time, and we tentatively correlate this cooling with Younger Dryas events recognised elsewhere globally.