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High-resolution geomorphological mapping of the Pico and Cisnes basins, Patagonia (44-45°S)

Emma Cooper¹, Varyl Thorndycraft¹, Bethan Davies¹, Adrian Palmer¹, and Juan García²

¹Department of Geography, Royal Holloway, University of London, Egham Hill, Egham, Surrey, United Kingdom, TW20 0EX.

²Geography Institute, Pontificia Universidad Católica de Chile, Avda. Libertador, Bernardo O'Higgins 340, Santiago, Chile.

The drivers of latitudinal variations in glacier advance/retreat in Patagonia remain a fundamental question in palaeo-glacier studies. Broader climatic influences that underpin large-scale glacial fluctuations are mediated by topographic, calving, and process-related controls. A key step in understanding the relative importance of these factors in localised glacier response is a thorough investigation of geomorphological evolution.

In southern South America, large ice-lobes associated with the eastern flanks of the former Patagonian Ice Sheet terminated in the stepparian foothills. The geomorphological records accompanying these palaeo-glaciers represent an invaluable tool for reconstructing past glacier fluctuations. In the Pico and Cisnes valleys (44-45°S), ice-lobes underwent multiple advances, likely since the onset of the Great Patagonian Glaciation (~1.1 Myrs ago). The first account of Pico glacial geomorphology and the recognition of palaeo-lake existence was made by Caldenius (1932). Since then, only limited geomorphological investigations of the valley have been undertaken.

Here we present a high-resolution geomorphological map of the Pico-Cisnes valleys based on mapping from satellite imagery at a 1:5000 scale, supported by ground-truthing in the field. Newly mapped ice limits, glaciolacustrine and glaciofluvial landforms are presented and include moraines, palaeo-shorelines, ice-contact fans, crag and tails, glacially-scoured bedrock, outwash plains and meltwater channels. These landforms provide new insights into landscape evolution essential in understanding the complex glacial/glaciolacustrine processes of the Cisnes and Pico valleys. Moreover, such data will underpin new geochronological frameworks, and allow fresh insights into the spatial and temporal response of these central Patagonian palaeo-glaciers to the onset of deglaciation.