



The deglaciation history of Tierra del Fuego: Blending geomorphology and lacustrine geophysics at the end of the world

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At 55°S in the Island of Tierra del Fuego, Lago Fagnano is located in one of the most important and extensive Late Pleistocene glaciated regions of southernmost South America. The lake is the largest (ca. 110 km long) and southernmost non-ice covered water body in the world. On-shore geomorphological information combined with geophysical data acquired in the lake allowed us to reconstruct the fluctuations of the former Fagnano glacier. The geophysical survey included high-resolution 3.5 kHz (pinger) single-channel and 1 in3 airgun multi-channel systems, thus allowing the unique opportunity to visualize both the most recent lacustrine sediments and the oldest glacial deposits, respectively.

Here we propose the first continuous reconstruction of the Fagnano glacier fluctuations amalgamating glacial depositional environments exposed on-shore with submerged buried moraines recognized in the seismic survey.

The former Fagnano glacier flowed eastwards from the Darwin Cordillera fed by more than 50 tributary glaciers. An alpine-type landscape, including arêtes, cirques, trun-

cated spurs and hanging valleys, developed in the western region of the present lake, while a piedmont-type landscape including lateral moraines, glaciofluvial and glaciolacustrine terraces and an ice-disintegration landscape, developed in the eastern region. The glacier spread over the low ranges and lowlands through three different lobes and was drained by four main outwash basins directly into the Atlantic Ocean. During the maximum ice-expansion, the ice-covered area is estimated ca. 4000 km², the maximum length of the main lobe ca. 132 km, and the general slope ca. 8°. Four terminal positions were identified but their chronostratigraphic relationship is still ambiguous due to the lack of datable material. Basal dates of peat bogs indicate that the ice disappeared from the present lake surroundings during the Late Glacial (ca. 12.3 ka. BP). A set of submerged frontal moraines covered by lacustrine infilling identified in the seismic survey suggests occasional eastward re-advances of the paleo-glacier within the overall westward deglaciation pattern. These re-advances may correspond to regional cold events such as the Antarctic Cold Reversal and perhaps even to global events such as the Younger Dryas. Sedimentary cores may provide datable material to determine the age of these events. The latter may help solving several standing issues dealing with the phase and timing of glacier fluctuations in the southern hemisphere allowing a direct link between Antarctic and South American paleoclimate records. Further comparison to other marine and continental archives will improve our understanding of the forcing mechanisms behind climate change and to validate the outcome of existing ocean and atmospheric climatic models for the Southern Hemisphere.