



## **Deglaciation in the semi-arid Andes of Chile (32°–34° S) – results from geomorphological mapping and geochronology**

Hans Fernández (1), Juan Luis García (1), Isabelle Gärtner-Roer (2), Samuel U. Nussbaumer (2,3)

(1) Pontifical Catholic University of Chile, Institute of Geography, Santiago, Chile (hdfernandez@uc.cl), (2) University of Zurich, Department of Geography, Zürich, Switzerland, (3) University of Fribourg, Department of Geosciences, Fribourg, Switzerland

Reconstructing the evolution of the glacial landscape of the semi-arid Andes (32°–34° S) during phases of Holocene deglaciation is key to understand the responses of the cryosphere during warmer periods such as the current one. Despite having geomorphological records with good degrees of preservation, few studies have addressed the changes of the Andes during the glacial-paraglacial transition.

In this paper, we investigate and compare geomorphological mappings of four glacial sub-basins of the central Andes of Chile: Juncal Norte (32° S, glacier terminus at ~ 3000 m asl.), Loma Larga (33° S, terminus at ~ 3000 m asl.), Nieves Negras (33° S, terminus at ~ 3000 m asl.), and Universidad (34° S, terminus at ~ 2500 m asl.). The ablation zones of Loma Larga and Nieves Negras glaciers have a mantle of debris, which suggests a process of ablation in situ rather than retreat of the glacier tongue. Both glaciers have a morphology of internal collapse in their debris-covered section. On the other hand, Juncal Norte and Universidad glaciers both have lateral moraines with ice cores, where the differential ablation has triggered backwasting and downwasting processes. The presence of ice-cored lateral moraines indicates greater activity of processes in the lateral sections. The Universidad glacier is characterized by two branches feeding the glacier tongue which shows a prominent medial moraine.

For the first time in this part of the Andes, we used <sup>36</sup>Cl terrestrial cosmogenic nuclides (TCN) for dating deglaciation geomorphology. We complement our <sup>36</sup>Cl data with <sup>14</sup>C ages that suggest that glaciers advanced before ~2500 and then before ~850/1000 years BP.

The combination of the geomorphology and the geochronology in the different proglacial areas allows the analysis of the deglaciation history and related processes. Identifying how ablation occurs in semi-arid mountain environments is important to assess the behaviour of ice under changing climatic conditions and its preservation under a cover of debris. One of the characteristics and challenges of the deglaciation in the semi-arid Andes is the high production of debris in the ablation zones.