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A multi-method approach to constrain glacier geometry changes between the Gran Campo Nevado and Pacific Ocean during last glacial-deglacial phase

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Abstract

Presently a strong correlation exists between southern westerly wind (SWW) strength and precipitation west of the Patagonian Andes (r=0.8; Garreaud *et al*., 2013). As a result glacier chronologies west of the Andean divide are capable of recording local to hemispheric palaeoclimatic shifts during the late Quaternary better than their eastern counterparts. The aim of the #ChileFjords18 project is to develop a detailed understanding of glacier expansion and manner of recession of intermittently marine terminating outlet glaciers to unravel the interplay between glaciological, climatic and oceanographic forcing during the last glacial-deglacial phase in south-western Patagonia. To reach this aim, we conducted a field-expedition in November 2018, where we combined geomorphic mapping techniques (terrestrial and marine) and geochronological methods to constrain glacier geometry changes of two major outlet glaciers (Icy and Xaltegua) between the Gran Campo Nevado and Pacific Ocean (52°S, 72-74°W). High-resolution terrestrial and marine geomorphic mapping is integrated to understand sub- and marginal glacier dynamics. Cosmogenic surface exposure dating of bedrock and erratics is used to establish vertical and horizontal retreat rates of the former Icy and Xaltegua outlet glaciers. Given the hyper-humid setting in the south-western fjords of Chile (Kilian & Lamy, 2012), we also apply a novel approach to determine sample-specific weathering rates by combining cosmogenic and optically stimulated luminescence techniques (Sohbati *et al.,* 2012; Lehmann *et al.*, 2018). The latter is relevant to assess impact of weathering rates on final cosmogenic surface exposure ages. By using a multi-method approach we hope to provide high-resolution empirical data for integration and testing of regional to global glacier-climate models spanning the last glacier termination.

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