



Modelling piedmont lobe collapse in the North Patagonian Icefield

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San Quintin glacier is the largest glacier in the North Patagonian Icefield, which nowadays terminates into a proglacial lake. In the last 70 years, San Quintin has experienced a near-complete collapse of its snout as a consequence of prolonged calving and has gone from being piedmont lobe occupying an area larger than the proglacial lake to a short glacier tongue. Its neighbour San Rafael glacier appears to have experienced a similar retreat during the Little Ice Age (LIA). The collapse of these ice tongues has the potential to affect the dynamics of other parts of the icefield, as their icesheds are shared with five other main outlet glaciers. The aim of this study is to use ice sheet modelling to investigate the retreat mechanism of San Quintin glacier and compare its collapse with that of San Rafael glacier, as well as its effect on the remainder of the ice field, and to understand its role in the present-day rates of thinning of the icefield.

Using the BISICLES ice sheet model, the piedmont lobes of San Rafael and San Quintin glaciers are allowed to grow to their LIA positions, based on the location of terminal moraines. The collapse of these lobes is then triggered using a combination of climate forcing and crevasse models. Results show that the anomalously high present-day thinning rates are largely attributable to a dynamical response rather than SMB forcing.