



Towards an annually-resolved record of Lateglacial Patagonian ice sheet dynamics using glaciolacustrine varves

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Proglacial sedimentary archives, in particular, glaciolacustrine varve sequences, offer the potential for detailed reconstructions of past ice sheet dynamics. Specifically, glaciolacustrine varves (i) allow reconstructions of sediment (and thus meltwater) influx at annual and even sub-annual resolution; and (ii) provide a continuous, annually-resolved chronology to estimate rates of change and/or the duration of significant events in the deglaciation of a basin. In South America, glacial geologists have relied heavily on cosmogenic nuclide exposure dating to construct chronologies for palaeoglaciological activity. Whilst effective, the typical uncertainties associated with boulder dating methods ($\pm 10\%$) preclude the investigation of short-term (e.g. \leq centennial-scale) glacier and/or climatic change(s), which are shown to be important at modern ice-margins. Moreover, moraine chronologies are fragmentary, and inherently biased towards episodes of positive glacier mass balance (i.e. moraine construction), and thus limit our understanding of ice sheet retreat dynamics. By contrast, long, continuous, high-resolution (i.e. varve) palaeolimnological records have the potential to significantly refine models of ice sheet deglaciation. In this talk, we present data from Valle Fenix Chico, in the Lago Buenos Aires (LBA) basin (-46.57°S -71.07°W), in which ice-contact Glacial Lake Buenos Aires formed as the LBA ice lobe of Patagonian ice sheet withdrew from its innermost LGM moraine ($\sim 17.2 \pm 0.9$ ka). Thick ($>40\text{m}$) sequences of laminated glaciolacustrine sediment were deposited in the palaeolake, and are now exposed in a sub-aerial canyon that was cut when the lake drained. We report on the detailed macro- and micro-facies of the LBA sediments. In particular, we: (1) develop a process model for the formation of silt and clay couplets, which suggests an annual (varve) origin; (2) present varve series for the initial phase ($\sim 1\text{kyr}$) of LBA ice lobe deglaciation.