

Between ~1.8 and ~0.56 Ma, a series of four closely spaced moraines were deposited between ~1500- and 1490-m elevations (~85–95 m above present Taylor Glacier). During the last ~0.32 Myr, the level of upper Taylor Glacier in Kennar Valley retreated from ~1475-m elevation (~70 m above present values) to its present value of ~1405 m elevation.

Throughout all intervals of moraine deposition, the glacier margin remained cold-based (frozen to its bed) and lacked significant surface melting. There are no textural features within drifts to suggest clast transport beneath wet-based ice (i.e., no striated, molded, or polished clasts) and moraines lack associated outwash sediments. The implication is that climate conditions during drift deposition at this site were essentially similar to modern conditions.

Comparison of our moraine record with published reports for fluctuations of Taylor Glacier elsewhere in the Quartermain Mountains, and with a dated moraine record from Ferrar Glacier (also sourced from Taylor Dome), reveals consistent ice-surface changes, highlighting minor, but widespread ice recession in southern Victoria Land since the mid- to late-Pliocene. The combined records show an atypical relationship with average global temperatures, with higher-than-present ice levels during globally warm periods, including the Pliocene climatic optimum (~3.0–3.1 Ma), MIS 31 (~1.0 Ma), and MIS 5.5 (~125 ka) (Brook et al., 1993; Marchant et al., 1994; Higgins et al., 2000; Staiger et al., 2006). The Kennar Valley glacial record highlights the potentially complex and non-uniform response of Antarctic ice to climate change. The record suggests low-amplitude fluctuations of Taylor Dome during the last 3.1 Myr, while offshore sediment cores indicate considerable variability in the extent of grounded marine-based ice from the WAIS in the Ross Embayment (Fig. 1) (Naish et al., 2009).

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